AD-A132 785 AN INVENTORY MODEL FOR MANAGEMENT OF US COAST GUARD 1/1
CLOTHING FACILITIES(U) NAVAL POSTGRADUATE SCHOOL
MONTEREY CA C J DICKENS ET AL. JUN 83 NPS-54-83-005

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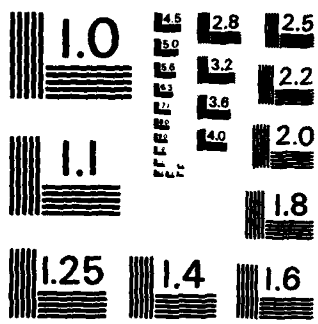

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NPS-54-83-005

NAVAL POSTGRADUATE SCHOOL

Monterey, California

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AN INVENTORY MODEL FOR MANAGEMENT
OF
U.S. COAST GUARD CLOTHING FACILITIES

by

Charles J. Dickens

June 1983

Thesis Advisor: A. W. McMasters

Approved for public release; distribution unlimited

Prepared for:
COMMANDANT (G-FLP) U.S. COAST GUARD
Washington, DC

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER NPS 54-83-005	2. GOVT ACCESSION NO. AD.A132 785	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) AN INVENTORY MODEL FOR MANAGEMENT OF U.S. COAST GUARD CLOTHING FACILITIES		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis June 1983
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) CHARLES J. DICKENS in conjunction with Alan W. McMasters		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		12. REPORT DATE June 1983
		13. NUMBER OF PAGES 94
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Inventory Analysis
Inventory Control
Uniforms
Forecasting
Coast Guard

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Commandant of the Coast Guard recently expressed concern over the inadequate support of uniform items to Coastguardsmen.

This thesis is in response to this concern and proposes a periodic inventory model which can be expected to provide effective inventory management of clothing facilities. The proposed model offers improvements in forecasting demand and by increasing customer satisfaction through increased service

levels. The proposed inventory control model has been developed in two parts, one for forecasting recruit demands and the other for sales demands. While the first part of the inventory model is only applicable at the Cape May Training Center, the second can be used throughout the Coast Guard and is offered as a partial solution to the uniform support problems.

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An Inventory Model for Management of U. S. Coast Guard Clothing Facilities

by

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Submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
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ABSTRACT

The Commandant of the Coast Guard recently expressed concern over the inadequate support of uniform items to Coastguardsmen. This thesis is in response to this concern and proposes a periodic inventory model which can be expected to provide effective inventory management of clothing facilities. The proposed model offers improvements by forecasting demand in order to mimimize stock outages and by increasing customer satisfaction through increased service levels. The proposed inventory control model has been developed in two parts, one for forecasting recruit demands and the other for sales demands. While the first part of the inventory model is only applicable at the Cape May Training Center, the second can be used throughout the Coast Guard and is offered as a partial solution to the uniform support problems.

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I. INTRODUCTION

Inventory management and inventory problems are common to all organizations. Inventory management does not add any value to the merchandise per-se, but value is obtained by virtue of the existence of the inventory, its availability and its movement at the right time to the right place.

Providing the right sized uniforms in the proper quantity to each member, is the goal of the Coast Guard's clothing and small stores system.

However, lack of adequate uniform support has been the single most constant criticism of the Coast Guard clothing system by both enlisted and officer personnel since the adoption of the Coast Guard uniform eight years ago. Complaints about poor clothing system support have run the gamut from the retail outlet always being out of stock of a popular size item to the lack of a dress uniform for a new recruit. The complaints have become so numerous that the Commandant of the Coast Guard stated in his annual State of the Coast Guard Address on January 20, 1983, "I want to solve the uniform problems promptly" [Ref. 1]. In order to alleviate the clothing support problems the Commandant initiated a review of uniform logistics and, as an immediate measure of relief, established a centrally operated, "tuned up", mail order system [Ref. 1].

Many reviews of the clothing support system by both local commands and Coast Guard Headquarters (G-FLP) have been conducted in order to identify and solve the problems of the clothing system. The most recent review occurred in April of 1983 by the staff of Commandant (G-FLP) [Ref. 3]. Some of the problems that were discovered are service wide; such as, limited manpower resources and shrinking budget authorizations. Other problems that were discovered are as a result of poor operating policies; such as the clothing system did not always have a standard requirement for capturing and using demand history for forecasting purposes. Another problem was that the clothing inventory management schemes were as numerous and diverse as the clothing locker locations because each facility is managed at the local level. Finally, there has been a general lack of management interest and support from all levels of command because the clothing support system problems were considered to be "back burner" issues [Ref. 2].

Fortunately, the science of inventory management is well developed outside of the Coast Guard clothing system and techniques are available which can provide immediate improvements. As a consequence, this thesis proposes an inventory model for the management of clothing inventories which is quite contemporary, in addition to being easy to use.

The objective of this thesis is to suggest improvements to the Coast Guard clothing and small stores inventory management system. In particular, it presents a system inventory control model for deciding how much and when to order. It also outlines the steps required for successful implementation. Inventory control models for individual clothing lockers are also proposed.

The background of the clothing system and a discussion of the current clothing operation is given in Chapters II and III respectively so that the reader will gain an insight into the shortcomings of the existing system. Chapter IV, which is a discussion of how demand and ordering data was obtained and analyzed, provides the necessary basis for the development of the appropriate inventory control model. Chapter V then presents the proposed inventory control model for management of the clothing system. Finally, Chapter VI presents conclusions and recommendations about the implementation issues of the proposed model.

II. BACKGROUND

A. COAST GUARD UNIFORM HISTORY

Prior to 1975, the United States Coast Guard (CG) did not have its own distinctive uniform. Instead it modified the U.S. Navy uniform with various insignia in order to meet the uniform needs of the service. As a benefit of using the Navy's uniform, the Coast Guard clothing facilities did not need to concern themselves with anticipating customer demand for uniforms. Their primary operating concern was to keep enough stock on hand to satisfy immediate needs. This style of clothing management was prevalent because of the belief that if uniforms were needed they could always be obtained from the Navy on short notice. Additionally, those Coast Guard personnel that were located reasonably close to a Navy base shopped at the Navy clothing facility in lieu of the Coast Guard facility because of convenience and a larger merchandise selection.

In 1975 the Coast Guard shifted to its own distinctive blue uniform, affectionately known as "Bender Blues," after the Commandant who ordered the change, ADM Chester A. Bender, USCG(Ret.). Soon after, the Coast Guard clothing facility managers began to realize the complexity of clothing and small stores management. This clothing support system was a minor concern of managers since complaints about uniform availability were minimal. Because there appeared no reason to do so, no effort had been made to capture demand history or economize operational costs.

B. COAST GUARD CLOTHING FACILITIES

Currently there are over twenty clothing facilities, also known as clothing lockers which provide clothing support to Coastguardsmen. These are independently managed and operated at the local level. Three of the twenty, are major clothing facilities and are located at each of the following training centers: USCG Academy, New London, Conn., USCG Recruit Training Center, Cape May, N.J., and USCG Reserve Training Center, Yorktown, Virginia. The major training centers are primarily concerned with initial issue of male and female seabags to new recruits and secondarily concerned with retail sales. The recruit seabags contain all of the necessary uniform items and accessories prescribed by Commandant (G-P) that go into making up the uniform wardrobe of Coast Guard personnel.

Of the remaining 17 facilities there is at least one clothing locker in each of the twelve Coast Guard Districts. The remainder are at selected Headquarter's units such as the Coast Guard Yard and various Support Centers. These District and Headquarters facilities are primarily concerned with providing for retail sales of uniform items. Their customers includes active duty personnel, retired Coast Guard members, Coast Guard Reservists, and Coast Guard Auxiliarists.

The clothing facility at USCG Training Center, Cape May, N.J. has the sole responsibility for processing mail-order purchases of uniforms and accessories.

Clothing items currently stocked in the clothing lockers include those items which make up the male and female seabags plus the necessary range of rating badges and devices required to be worn on the uniform as well as some limited optional items that have been authorized for wear such as cold weather hats and sweaters.

C. FUNDING INFORMATION

The Coast Guard obtains funds for its clothing and small stores through the Coast Guard Supply Fund which is authorized by 14 USC 650. The Supply Fund Account for uniforms is defined as follows:

SUPPLY ACCOUNT 81.00 - CLOTHING AND SMALL STORES This inventory consists of uniform items and accessories for issue/sale to regular, reserve and retired Coast Guard members and Coast Guard Auxilary [Ref. 6].

The Supply Fund is a "revolving" fund account which operates by financing the procurement of material and replenishes itself with the revenue collected from retail sales. For recruit issue items the fund revolves in the following manner: as inventory is consumed (issued) it is charged to an operating expense account for Active Duty personnel, 01.00, and the costs are credited to the 81.00 Clothing and Small Stores account. The active duty personnel account is part of the annual Coast Guard operating appropriation authorized by Congress, while the supply fund is authorized separately.

Each clothing facility orders its uniforms directly from the wholesale source, DPSC, as there is no designated Inventory Control Point (ICP) for uniforms. Funds for payment of uniforms revolve through the Headquarters managed Supply Fund, 81.00, to DPSC.

Each clothing facility is authorized to stock sufficient uniform items in order that the total inventory value does not exceed a pre-established dollar ceiling set forth by USCG Headquarters Commandant (G-FLP). In any case, the value of inventory should not exceed the historic demand figure for a three months' supply of uniforms and accessories [Ref. 4]. As long as the clothing facility is kept at or below the established ceiling value of inventory the local command can operate the facility as it sees fit. In particular, each command has considerable freedom to determine the type and quantity of each item it wishes to keep on hand.

D. THE NEED FOR A STUDY OF COAST GUARD CLOTHING FACILITIES

The current operating policy of clothing facilities is set forth in the CG Comptrollers Manual as follows:

> It is the Coast Guard policy to provide each Coast Guard recruit a complete seabag of uniform items as prescribed by Commandant (G-P). Further, the Coast Guard will provide an effective means by which each member may replace items or augment his uniform requirements [Ref. 5].

It is the last sentence in this policy statement which has caused an on going problem. Since the change to the new uniforms Commanding Officers of remotely located Coast Guard units have complained that their enlisted crew members were unable to conveniently replace worn out working uniforms through the existing clothing support system. It seems that the desired uniform item was either not stocked at all or always on back order. In some isolated cases, Coastguardsmen had resorted to buying Coast Guard look-alike utility work clothes from Sears in order to satisfy their uniform needs.

The plans for first issue of the new uniform were well thought out and, as a result, the problem of replacement sales did not start to materialize until several years later when the initial issues started to wear out. By 1978, clothing facilities had to satisfy both the demand for new issues to recruits as well as the demand for replacement sales. The clothing support system was forced to react to this new demand. In spite of efforts by Headquarters and the clothing facilities the feeling of poor support prevails at many local commands.

In order to address the need for a review of the clothing and small stores system an analysis of the operations of the USCG Training Center Cape May, New Jersey, Clothing Facility was conducted. This facility was selected because it is the largest clothing operation in the Coast Guard and would therefore has the largest data base. It was also felt that the Cape May facility was best for analysis because any demand history that was available would include information from recruit issues, retail sales and mail order sales. A discussion of the Cape May clothing facilities' current operations and inventory management procedures are presented in Chapter III.

III. CURRENT CLOTHING OPERATIONS AND INVENTORY SYSTEM

A. POLICY GUIDANCE

The clothing inventory policies discussed will be those that have been promulgated by CG Headquarters and adapted for use by USCG Training Center Cape May, New Jersey. The existing policy statement is composed of two sentences and is treated in two parts. The CG Comptroller's Manual states:

> It is the Coast Guard policy to provide each Coast Guard recruit a complete seabag of uniform items as prescribed by Commandant (G-P) [Ref. 6: p. V-4-19].

The above is interpreted as the objective for initial clothing issues to new recruits while the following is interpreted as the objective for retail clothing sales:

> The Coast Guard will provide an effective means by which each member may replace items or augment his uniform requirements [Ref. 6].

These two policy sentences have been treated as separate managerial objectives with separate operating methods. However, they have their effectiveness measured in terms of satisfying the whole policy.

B. RECRUIT SEABAG ISSUES

Both male and female recruits are issued their uniforms in two parts. The first issue of clothing takes place during the recruits' first week of training and primarily consists of basic clothing and working type uniforms. The initial issue comprises approximately 54% of the total dollar value of the seabag. Several weeks later, the recruit receives the second issue of clothing. The delay in receiving all of the uniform items is based in part on the fact that if any significant body weight loss was to occur it would have happened by the third week of training. Dramatic recruit body weight loss can result in ill fitting uniforms and increased tailoring costs. Also by the third week of training it is relatively certain that a recruit will complete basic training and not be discharged. When a recruit is discharged, the uniforms that were issued to him or her cannot be reissued. Thus, if a recruit is discharged prior to the second issue, the Coast Guard realizes $245.84 in uniform savings. Appendix A provides the list of items in the first and second issues.

C. OVER THE COUNTER SALES

The Cape May clothing facility is open for retail sales during the normal work week except for those periods when recruits are receiving their first or second issues. The clothing facility is open on selected weekends for CG Reserve and Auxilary business.

Additionally, the Cape May clothing facility is the sole point for processing mail orders of uniforms. Mail orders are paid for by check or by having the amount due deducted from the member's pay. All mail orders for clothing must be processed within two working days, this includes notifying the member if the item or items are out of stock or on back order [Ref. 6].

D. INVENTORY PROCEDURES AT CAPE MAY

1. Before 1982

Prior to 1981, the Cape May clothing locker used a "tariff" system for ordering uniforms. The tariff system was developed using two years' worth of issuing history in order to calculate the total number of issues and sales for that period. The total figure was computed for each size of each item in both the men's and women's seabags (about 1200 line items). A factor for each size of each item was also calculated by figuring out what fraction each size was of the total demand for that item. The following example illustrates the calculation:

> Seabag item: White gloves. White gloves come in three sizes, small, medium and large. There were 320, 1020, and 660 respective issues of these gloves over a two year period. The total gloves issued were 2,000 (320 + 1020 + 660). Converting each size to a fraction of the total yeilds; small = 0.16 medium = 0.51 and large = 0.33

Appendix B presents a detailed breakdown of the tariffs for the items in the men's and women's seabags.

Use of the tariff system was based upon receiving advance notice of the number of expected recruits for a given training period. For example, if it were known that 100 recruits were going to be inducted for a given month, then the clothing personnel could calculate the proper quantity of items to order by multiplying the tariff percentage times the number of anticipated recruits. The following example in Table I is a good representation of how the system worked for an induction of 100 recruits. One sweater is issued to each female recruit.

TABLE I

Tariff System Example

ITEM	SIZE	TARIFF	RECRUITS	ISSUE QTY	ORDER
Sweater	S(30-32)	.31	100	1	31
(female)	M(34-36)	.57	100	1	57
"	L(38-40)	.10	100	1	10
"	XL(42-44)	.02	100	1	2

Although the old factor system was awkward to use when it was first implemented, its use today could be greatly simplified by using one of the many inexpensive mini-computers currently available. The development procedure for the old factors is the same procedure used to develop the new probabilities for the proposed model. (See Appendix C and D for the new probability factors.) It should be noted that there is a tendency for the factors to become obsolete if they are not periodically reviewed. According to the Cape May Clothing Locker Manager, the old factors were not updated while they were in use [Ref. 8].

The old factors for men's Ball caps and Garrison caps were plotted against the new probabilities for those items in order to see if any significant changes had occurred since the old factors were developed five years ago. As can be seen in Figure 3.1 there is very little difference for Ball caps but the probabilities for Garrison caps varied somewhat more. It is felt that the new probability factors are more representative of current trends since it was developed from more recent data. Therefore, the new probability factors, which are based exclusively on the empirical data, will be used throughout the proposed model.

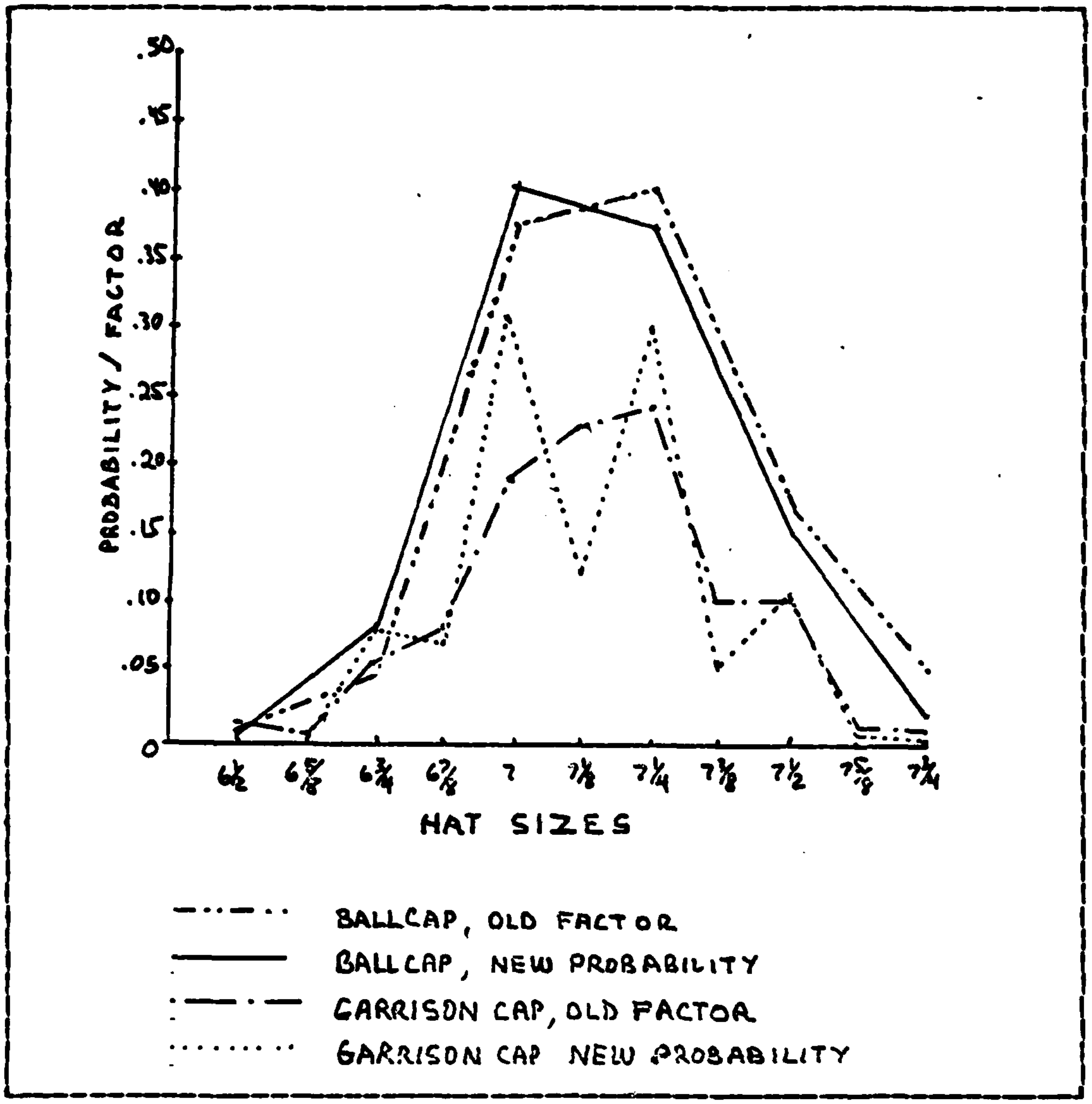

Figure 3.1 Comparison of Old Factors and New Probabilities.

According to the Clothing Manager at the Cape May clothing facility the old tariff system worked satisfactorily as long as he had advanced knowledge of the anticipated recruit load [Ref. 7]. The reason for the shift away from using the factor system is discussed in the next section.

2. Current Inventory Procedures

Beginning in the fall of calendar year 1981, some disruptions in the information flow of anticipated recruit loads occurred due to fluctuations in the annual Coast Guard budget. Since Personnel was unsure of their budget, recruiting was conducted at minimum levels and no schedule of anticipated recruits was made until later. As a result of the interruption in information flow the Clothing Manager dropped the tariff system in favor of a simpler system that did not rely on recruiting input [Ref. 8].

The current system of inventory management is a perpetual inventory system based on the philosophy of Economic Order Quantity (EOQ) and is referred to as the "Hi-Lo" system by Cape May personnel. Hi-Lo inventory management calls for the clothing manager to establish maximum and minimum levels of stock based on his experience. Then all that needs to be done when the level of stock falls to the minimum is to order sufficient stock to bring the level back up to the maximum.

E. CRITIQUE OF CURRENT INVENTORY METHODS

A perpetual system of inventory management requires that there be a continual review or observation of the inventory levels [Ref. 10]. However, there is no current mechanism for perpetually recording clothing issues or sales. In addition, the only required mechanism for recording the inventory level is the quarterly physical inventory. The only observation of inventory levels is when the clothing locker personnel visually inspect the inventory bins. The current system of quarterly recordings of inventory levels are indicative of a periodic model rather than a perpetual model.

Perpetual systems of inventory management are extremely useful, if used properly, and could be easily applied to the operations at the Cape May clothing facility. Some advantages of a perpetual inventory model are:

1. The order size is known.
2. Allows management to know as quickly as possible when the reorder point is reached.
3. Safety stock is only needed for the lead time period.
4. There is relative insensitivity to forecast and parameter changes [Ref. 9: p. 385.]

However, it should be noted that perpetual systems of inventory management also have the following weaknesses:

1. If managers do not take the time to study inventory levels of individual items, order quantities tend to be established by clerks.
2. Reorder points, order quantities, and safety stock levels may not be restudied or changed for years.
3. Delays in posting transactions can render the system useless for management control.
4. Clerical errors or mistakes in posting transactions can make the system impotent.
5. Numerous independent orders can result in high transportation and freight costs [Ref. 9].

Finally any perpetual type method of inventory management is reactionary in nature and fails to utilize any information besides demand history to anticipate future demand.

F. COAST GUARD SYSTEM WIDE INVENTORY PROCEDURES

The general inventory management policy for retail stock levels is:

> The quantity of an item that a retail stocking activity should have in inventory and on order shall be based on the demand experience(issues) for the item during the most recent twelve months [Ref. 6: p. IV-6-2].

The average monthly demand for an item is calculated by summing the most recent 12 months issuing history, subtracting any abnormal data, and dividing by 12. This mean monthly demand is then used in the calculation of the Requisitioning Objective and Reorder Point. In order for the reader to gain an understanding of the Coast Guard's procedures it would be useful to first define the terms Requisitioning Objective and Reorder Point. These terms are defined as follows:

1. REQUISITIONING OBJECTIVE (RO). The RO is the maximum value of the inventory position (the quantity of on hand plus on order minus any backorders). The RO is the sum of the:

    a. Operating Level: That quantity of an item that is required to sustain operations between orders. This is generally assumed to be three months' supply.

    b. Order/Ship Time Level: That quantity of an item expected to be issued during the time interval between order placement and receipt of goods. This is assumed to be one month of supply.

    c. Safety Level: That quantity which is an addition to the order/ship time level to protect against stock outages due to demands in excess of the order/ship time levels during that time interval until the order arrives. This is assumed to be a one month's supply.

    Therefore the RO is usually equal to (3 + 1 + 1 = 5) five months' supply.

2. REORDER POINT (RP). The reorder point is the trigger point or the level used to remind the inventory manager that he needs to replenish his stocks by placing another order. The RP is the sum of the Safety Level and the Order/Ship Time Level.

    Therefore RP is equal to (1 + 1 = 2) two months' supply.

These decision levels are based on monthly demand figures. The average monthly demand is posted and the inventory position is observed until such time as the RP is reached. The actual quantity to buy is determined by the difference between the RO and the inventory position. The net amount may be adjusted as necessary for minimum order quantities or for unit of issue packaging.

G. DEFINITION OF COAST GUARD INVENTORY EFFECTIVENESS

Supply effectiveness for district clothing lockers is defined by the CG Comptroller's Manual as follows:

> District clothing lockers shall make every effort to maintain a supply effectiveness rate of 85%. Inventory levels, however, must be maintained within the limits of Supply Fund authorizations. Improved effectiveness can best be achieved by careful stock management, i.e.: stocking those items for which there is a predictable demand and ordering on demand those items for which it is difficult to forecast demand [Ref. 6].

Supply effectiveness is determined by dividing the number of line item issues by the number of line item requests for items which are stocked. Stated differently, supply effectiveness is reached if you satisfy 85% of the customers who have requested items in stock.

Clearly, such a measure is inappropriate for recruits since they need as close to 100% effectiveness as possible. Unfortunately, the induction rate data is sometimes unreliable. If the recruit forecast were able to be improved to the point where it was extremely reliable then a forecasting system could be developed which would provide as high a effectiveness as is statistically possible. Techniques to improve this reliability are proposed in Chapter V.

IV. ANALYSIS OF DEMAND DATA

A. DEMAND DATA ANALYSIS OVERVIEW

The objective of this Chapter is to provide the reader with an explanation of the underlying analysis that took place regarding the formulation of the proposed inventory control model. This Chapter will describe the data examined and provide a discussion on the testing of a hypothesis which will become the basis for the use of empirical data in the inventory control model. Finally, this chapter presents a discussion of the clothing sales seasonality analysis. This material is presented separately so that the presentation of the proposed inventory model in Chapter V will not be encumbered with background material.

B. MATERIAL EXAMINED

1. Male and Female Seabags

In conducting an examination of the Cape May clothing locker, over 1200 stock record cards, representing all of the sizes and items required for the male and female seabags, were examined. Quarterly demand history for each size of each item in the sample was constructed by adding receipts (orders in) to the beginning balance on the stock record card and subtracting the ending balance for the period being examined. Some stock record cards contained two or three years' of data while others such as those for fast moving items, only contained one year's data. At least one year's data was available for all of the items in the seabag.

Although service stripes and rating badges are part of the uniform, no attempt was made here to include them as part of the seabag data analyzed.

Appendix C contains annual demand figures that were calculated for every size of every item in the male seabag during the period January 1, 1982 to December 31, 1982.

The enlisted recruiting statistics from fiscal year 1981, 1982, and the first quarter of 1983 were examined next. The enlisted recruiting statistics were essential in calculating the quantity of items that had been issued to recruits during the period being examined. The use of this information is described in the next section.

Since the Training Center at Cape May has been the only recruit training center for women, a review of all of the sizes and items in the female seabag was conducted as well. Data for the women's seabags were extracted and compiled as described above. Appendix D contains the annual demand figures for every size of every item in the female seabag.

2. Enlistment Data

Monthly, quarterly and annual enlisted recruiting statistics were extracted from the FY 1981 and 1982 Annual Report of Enlisted Recruiting Statistics [Ref. 11]. In order to capture the demand that the recruits placed on the clothing system, the number of recruits times the quantity of an item (ignoring size) in the seabag was determined to be the recruit demand. The summary of recruiting statistics used in this analysis is contained in Appendix E for FY-1981 and Appendix F for FY-1982.

It should be noted that until March 1982 there were two recruit training centers in the Coast Guard. The other Training Center was in Alameda, California, and only trained male recruits. It was closed at the end of March 1982 and all recruit training was concentrated at the Cape May facility. Upon closure, a major portion of the Alameda uniform stock was shipped to the Cape May clothing facility. The data analysis that follows assumes a single training center.

C. RECRUIT DEMAND MODEL

A recruit demand model is an important part of the inventory model. Analysis of the recruit demand data provided the structure for that model.

Since the number of uniform items in the seabag is so large it was first necessary to limit the data examination to several uniform items from the seabag. These items were selected based on available data history from their stock record cards and because they are indicative of the total population of clothing items. The seabag items that were analyzed in detail included the light blue short sleeved shirt, the utility blue working shirt, skivvies, and ball caps.

A matrix, like that in Table II, was constructed for each item. Column A specifies the item and the amount of the item required to be in the seabag as set by the Commandant (G-P), column B lists the various sizes of the item, and column C presents the total demand for each size of the item for calendar year 1982.

The hypothesis of normality was tested using the CHI-Square goodness of fit test. Unfortunately none of the distributions passed the goodness of fit test, which means that the observed sample distribution did not "fit" closely enough to the theoretical distribution so that the latter could be used in its place [Ref. 12].

TABLE II

Data Analysis Example

(A) Item	(B) Size	(C) Demand
Utility Shirt, Short Sleeve (2 each)	XS	148
	S	4390
	M	5811
	L	2083
	XL	731

Since the Chi-Square goodness of fit test failed, the probabilities associated with the demands for each size of a given item was based exclusively upon the empirical data. A close inspection suggests a distribution skewed to the right for all items coming in sizes. This is probably due to the fact that the demand distribution reflects the aggregate of demands from men and women.

The data matrix in Table II can now be expanded to reflect the empirical probabilities associated with each size of each item. Table III contains the Table II data in columns A through C and the empirical probabilities are in column D. Table III also contains subdivisions of the total demand into that for recruits and that for all other personnel ("sales").

Data for column E was calculated as the product of the number of recruits trained during the period, the required seabag quantity and the probability of the size. The reasoning behind this is that if there were 3745 recruits that received 2 shirts each, there would be a total of 7490 shirts that should have been issued to recruits. The distribution of issues by sizes of the total shirts issued to recruits was assumed to follow the population probability values (column D). Column F was generated by subtracting

TABLE III

Expanded Data Analysis Example

A	B	C	D	E	F
Item	Size	total	prob.	issues	sales
Utility Shirt, Short Sleeve (2 each)	XS	148	.0112	84	64
	S	4390	.3335	2498	1892
	M	5811	.4414	3306	2505
	L	2083	.1582	1185	898
	XL	731	.0555	416	315
Totals:		13163	1.0000	7490	5673

column E from Column C. This is the basis of the recruit demand model that will be used in the inventory control model.

D. SALES DEMAND DATA

Sales data (column F, Table III) were examined for the sample items listed earlier as well as several other items from the seabag, for any seasonality affects. It was expected, for example, that short sleeved shirts are sold more frequently in the summer months than in the winter months. On the other hand, the demand for skivvies was not expected to be seasonal. The sales data were therefore plotted over the two years of available records. Figure 4.1 is a graph of the six items that were examined for seasonality.

No anticipated seasonal spikes appeared, however, there was an obvious overall downward trend of the items sold. This decreasing trend in sales can be explained by the decrease in total personnel end strength that occurred in the Coast Guard during the same period of time.

Even after the data was adjusted for the decreasing population the items listed in Figure 4.1 showed virtually no season fluctuations. Thus, the demand for those items

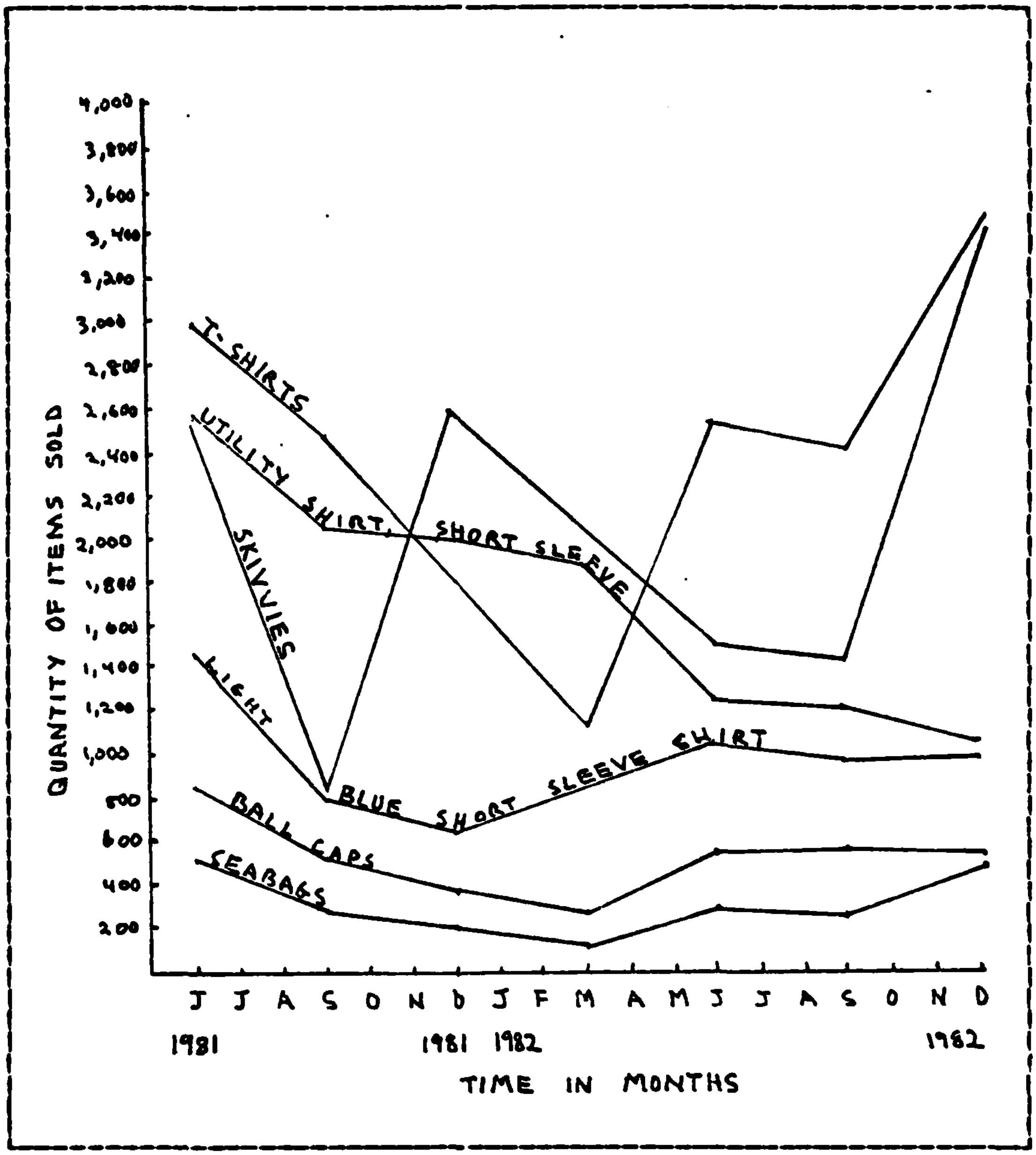

Figure 4.1 An Evaluation of the Seasonality of Sales.

for which seasonality was expected to be a factor did not show any such effect and the demand for those for which seasonality was not expected to be a factor did behave as expected.

The sales demand model for an item is therefore assumed to be a function of the end strength population with the new "tariff" distribution describing the spread of demand over size.

B. SUMMARY OF DATA EXAMINED

In summary, the demand data analysis has been used to develop the basis for recruit and sales demand models. Both contain the tariff model as an integral element. The recruit demand model should obviously be directly related to the induction schedule and the sales to the end strength population. Seasonal affects on sales apparently do not exist.

Separate demand models for recruits and sales can be expected to provide a more accurate total forecast of future demand. The next chapter will address the development and implementation of an inventory model that will incorporate these separate demand functions. That model should provide an effective solution to the uniform inventory control problem at Cape May.

V. THE PROPOSED INVENTORY MODEL

A. INVENTORY CONSIDERATIONS

In the development of a proposed inventory model for uniform items, it is important to keep in mind the nature of the problem and how the management of inventory will relate to the operation of the clothing facilities. As previously noted, there are currently excessive numbers of items in those sizes that turn over slowly and there are persistent stock outages in many of the popular (high demand) items. With this in mind, the important factors that any proposed inventory model should have are: first, it should contain a method for determining the correct amount of stock to carry and second, it should be implementable at a reasonable cost.

In order to develop a model that will accurately determine the correct amount of stock to carry on hand, a thorough understanding of the demands placed on that system is needed. As was discussed in the previous Chapter, the demands on the Cape May clothing facility come from essentially two populations, recruit demands and sales demands. Since the demand requirements placed on the clothing support system come from these two diverse communities, it makes sense that their analysis should be conducted separately. Therefore the demands for the recruit population and for the sales population will be forecasted separately as will their requisite safety stocks. The proposed inventory control model will then weave these demand forecasts and safety stock forecasts into one effective model.

B. THE PROPOSED INVENTORY MODEL

The proposed inventory model is a periodic review model that uses quarterly reviews. The proposed model attempts to use advantageously some of the existing system's limitations. Periodic inventory review inventory models have the following advantages that are applicable to this situation:

1. With the periodic inventory system the quantity to be ordered is not fixed and the decision maker changes the quantity ordered to reflect changes in demand rate.

2. The reorder point is variable. Orders can be placed after the review point without having to wait for a minimum level of inventory to be reached.

3. The lead time for filling orders can be fixed or variable.

4. The periodic inventory system is well suited for inventory control when the supply sources are few or inventory comes from a central warehouse.

5. The periodic model provides improved management information due to accurate record counts [Ref. 10]

Such a model appears especially appropriate for use by Cape May because Cape May is required to conduct quarterly physical inventories [Ref. 6] and most of their uniform inventory comes from one source, DPSC. Because of these quarterly reviews, the proposed inventory model will generate periodic orders (quarterly) for all items. The combining of orders can save money by lowering ordering costs in the following ways:

1. It is much less expensive to add another inventory item to the same order than place a second order by itself.

2. There may be savings in transportation costs by shipping several items together.

3. Unloading and receiving costs may be less [Ref. 13].

Finally, it is just more convenient to order quarterly for the personnel involved in managing the clothing facility.

One feature of the proposed system is that the user must recognize that with a fixed order period, the safety stock level must be sufficient to provide protection against demand fluctuations during both the review period and the lead time. A simple but effective means for dealing with the additional coverage required by periodic review models is to convert the sum of the review interval and the order lead time to a constant factor and multiply the quarterly demand forecast by that constant. Since the lead times from DPSC are fairly consistent at 20 days plus or minus 10 days, [Ref. 16] it is felt that the use of a constant is warrented in this situation. Table IV provides such factor values assuming there are 91 days in a quarter.

TABLE IV

Lead Time Factor Chart

LEAD TIME DAYS	FACTOR
5	1.055
10	1.109
14	1.154
17	1.187
20	1.219
23	1.253
26	1.286
30	1.329

In order to facillitate the reader's understanding of the proposed model, each element will be discussed in detail.

The development of the proposed model requires a recruit demand forecast and a sales demand forecast. These forecast models are discussed in detail in the next two sections.

C. RECRUIT DEMAND FORECASTING

There are two parts to the forecasting model for predicting recruit demands. The first part is the actual number of recruits the Coast Guard plans to induct. This plan is created in USCG Headquarters, Commandant (G-PMR), and is based on the allowable Coast Guard force size set forth by Congress. The number of anticipated recruits is determined by the number of expected discharges, retirements, promotions, etc.

Prior to the training center consolidation in March of 1982, the number of recruits trained were geographically split on a 60/40 basis, with approximately 60% of the male recruits going to Cape May and 40% of the male recruits going to Alameda. All women recruits were trained in Cape May regardless of their geographical point of entry into the Coast Guard. The number of recruits trained for a given year was allocated to the training centers with some minor seasonal peaks occurring roughly in the spring and fall.

After the consolidation of recruit training at Cape May, the expected number of recruits was 440 per month except for December when 220 was scheduled [Ref. 14]. The actual numbers are not these values because of the effect volatile attrition rates have on the total end strength.

After the estimated recruiting requirements have been calculated by the Commandant (G-PMR), the forecast is distributed to the Commandant (G-FLP) who is responsible for managing the Coast Guard Supply Fund and for policy guidance for all of the clothing facilities throughout the Coast Guard.

Once a recruit induction schedule is known, the empirical data can be used to forecast the expected or average recruit demand for each size of each item. For example, if 400 recruits are anticipated for the upcoming quarter, then the expected recruit demands for the short sleeved utility shirts would be as shown in Table V below.

TABLE V

Recruit Utility Shirt Forecast

SIZE	PROBABILITY	RECRUITS	SEABAG REQUIREMENT	EXPECTED QUANTITY
XS	.0112	400	2 ea.	9
S	.3335	400	2 ea.	267
M	.4414	400	2 ea.	353
L	.1582	400	2 ea.	127
XL	.0555	400	2 ea.	44

These figures are obviously easily calculated for every item in the seabag.

This model follows the philosophy of Materials Requirements Planning (MRP). MRP has been found to be particularly useful in production when demand for a part is dependent on the demand for the completed product [Ref. 15]. The dependent demand variable could be the number of legs required for finishing a table or, as in this case, the number of each item that goes into making up a complete seabag which each recruit is supposed to receive. The idea behind MRP is that all of the necesary components, sub-components, and sub-sub-components are on hand prior to when they are needed for the finished product. The components and sub-components are listed and planned out in layers, the deeper the layer the smaller the sub-component. If the seabag can be considered as a finished good, then all of the items required for it need to be on hand prior to the demand caused by the recruits' arrival.

Using the 400 recruit example cited above it is clear that 400 complete seabags are needed in order to outfit those recruits. As was stated above, the average demand for each size in this seabag can be determined. However, it is possible that demand will exceed this average. Additional stock is needed to reduce this possibility. That stock is called safety stock. However, to build up a safety stock which would eliminate the possibility of a shortage in all cases could be very expensive. Therefore a level of safety stock that prevents a shortage in less than all cases is needed. This "service level" is defined as the percent of time that all demands are met from on hand stock. Stated differently, the service level is one minus the probability of being out of stock. For example a 90% service level has a one in ten chance of being out of stock. It should be noted that the higher the desired service level, the higher will be the required safety stock with its associated inventory carrying costs [Ref. 15]

The appropriate level of safety stock can be calculated using the following formula:

$$\text{SAFETY STOCK} = Z \cdot \sigma \qquad \text{(eqn 5.1)}$$

The term Z is defined as the number of standard deviations equivalent to the desired service level and σ is the standard deviation of the demand for a given size of item in the scheduled seabags [Ref. 15]

As with the average demand the level of safety stock is dependent upon the number of recruits expected. In order to approximate the standard deviation needed for the safety stock calculation, a standard deviation rate per recruit is calculated for each item. The idea behind the standard deviation rate per recruit is to link the quantity of safety stock to the number of recruits expected for induction. Further, the rate is calculated per size so that the proper quantity of each size can be ordered with respect to the number of recruits. The following steps outline the calculation of the standard deviation of demand per recruit for size XS Utility shirts:

1. Begin the construction of a table of data like Table VI by listing the demands for a given size and the number of recruits involved for each quarter of available data.

TABLE VI

Recruit Standard Deviation Example

QTR.	RECRUIT DEMANDS	#OF RECRUITS	EXPECTED DEMANDS	DEV.	DEV. PER RECRUIT
	Xq	Nq	Urq	Dq	Drq
MAR 81	133	958	48.95	84.05	.0877
JUN 81	24	503	25.70	-1.70	-.0034
SEP 81	34	521	26.62	7.38	.0142
DEC 81	34	477	24.37	9.63	.0202
MAR 82	23	986	50.38	-27.38	-.0278
JUN 82	34	1000	51.10	-17.10	-.0171
SEP 82	35	1027	52.48	-17.48	-.0171
DEC 82	0	732	37.40	-37.40	-.0512
Total	317	6204			

2. Calculate the average demand per recruit by dividing the sum of the recruit demands by the total number of recruits as is illustrated in Equation 5.2 below.

$$\mu_{RECRUITS} = \frac{\sum_{j=1}^{8} X_{qj}}{\sum_{j=1}^{8} N_{qj}} = \frac{317}{6204} = 0.0512 \qquad \text{(eqn 5.2)}$$

3. Compute the expected (predicted) demand during each quarter as the product of the average demand per recruit and the total induction quantity (Equation 5.3).

$$\mu_{rq} = \mu_r \cdot N_q = 0.0512 \cdot 958 = 48.95 \text{ (FOR MARCH 1981)} \qquad \text{(eqn 5.3)}$$

4. The difference between the observed (actual) demands and the expected demands calculated in equation 5.3 is called the deviation, Dq (Equation 5.4).

$$D_q = X_q - \mu_{rq} = 133 - 48.95 = 84.05 \text{ (FOR MARCH 1981)} \qquad \text{(eqn 5.4)}$$

5. The deviation calculated in Equation 5.4 is divided by the number of recruits to get the deviation per recruit (Equation 5.5).

$$D_{rq} = \frac{D_q}{N_q} = \frac{84.05}{958} = 0.0877 \qquad \text{(eqn 5.5)}$$

6. The final step is to compute the estimate of the standard deviation of demand per recruit. This is done by squaring each deviation, summing the squared deviations, dividing this sum by N-1 quarters, and taking the square root of the result (Equation 5.6).

From this recruit standard deviation rate the standard deviation of the total demand for a given size such as XS can be computed using Equation 5.7:

$$\sigma_{rq} = \sqrt{\frac{\sum D_{rq}^2}{N-1}} = \sqrt{\frac{0.0055}{7}} = 0.028 \quad \text{(eqn 5.6)}$$

$$\sigma_{RECRUITS} = \sqrt{N \cdot \sigma_{rq}^2} \quad \text{(eqn 5.7)}$$

where: N = number of recruits.

The above calculations, although lengthy, can easily be performed on any of the commercially available programmable calculators such as the Texas Instruments TI-59. Also an application could easily be created for the new C-3 Coast Guard terminal.

The next step is to determine when to place an order so that it arrives by the time the recruits need the seabags. According to Shipping and Receiving personnel of the Cape May clothing facility the average lead time to get an order filled from DPSC is approximately 20 days [Ref. 16]. This means that the order for the 400 recruits will need to be placed at least 20 days prior to the time the clothing is needed. Now if the system only orders once a quarter and a periodic review of on-hand inventory is made 20 days before the start of the quarter, the recruit demand over the 20 days plus the next quarter needs to be forecasted. Thus the recruit induction schedule for that time period must be totaled. Then the expected demand rate per recruit and the standard deviation of demand rate can be used in equations 5.3 and 5.7 to determine the mean demand and the standard deviation of demand over the 20 days plus the quarter.

It is probably easier to ignore the 20 days in initially implementing this forecasting model and use merely quarterly induction totals and then apply the lead time factor from Table IV. This is what is assumed for the remainder of this chapter.

Finally, the forecast parameter can then be combined with those from sales to determine the forecast of total demand.

D. SALES DEMAND FORECASTING

As was discussed in chapter IV, the stock record cards data merely reflect the total issues during the quarter and do not identify either the recruit or sales population separately. The total demand figures from the raw data were split by subtracting those demands that were expected to apply to the recruits and the remainder was assumed to be the sales figure for the quarter. The writer recognizes that part of this so-called sales figure could consist of items that were either lost or stolen or issued in kind (a free replacement of an item). However, in the absence of any better data, this sales figure should be useful for forecasting the expected or average demand.

In terms of a sales forecasting model that would be fairly easy to use yet would be sophisticated enough to yield accurate forecasts, the single exponential smoothing model was considered the most promising. Exponential smoothing is advantageous in that it gives greater weight to the more recent observations in demand without fluctuating rapidly to an occasional extreme shift in demand [Ref. 17: pp. 93-94.]. Also it takes into consideration the past forecasting errors in order to help focus in on the actual demand. Additionally, the exponential smoothing forecasting technique is simple to use and requires minimum data storage.

The formula for the exponential smoothing forecasting model is as follows:

$$f_{(i+1)} = \alpha d_{(i)} + (1-\alpha) f_{(i)} \qquad \text{(eqn 5.8)}$$

where:

f(i + 1) = the forecast for next quarter,
d(i) = the actual demand for the quarter just ended,
f(i) = the forecast from the previous period, and
α = a constant.

The smoothing constant, alpha, is usually determined judgmentally depending on the sensitivity of response desired for the model. Alpha lies between zero (no weight to recent actual demands) and one (all weight on recent actual demands) [Ref. 10: p. 40.] The smaller the value of alpha, the slower the response to changes in demand and conversely the larger the alpha the faster the response to changes in demand [Ref. 17: p. 93.] Guideline values for alpha range between 0.1 and 0.3 [Ref. 10: p. 40.] An alpha of 0.3 is suggested as being slightly more responsive to current demands. It is able to track major demand trend changes while smoothing out random fluctuations.

This forecasting model is slightly cumbersome in that the recruit demands must first be separated from the total demands and the residual is then what is left for forecasting sales demand. The exponential smoothing model could be easier to use if data regarding sales demand were kept separate from recruit demands. Although keeping separate demand histories would be prohibitively time consuming and expensive under the current manual inventory management scheme, it is not expected to be so when the "point of sale" data terminals are installed. According to CDR Brian Sonner, USCG, the current Chief of the Accounting Development Staff in Coast Guard Headquarters, the purchase and installation of the point of entry equipment will take place by the summer of 1983 [Ref. 18].

The sales standard deviation forecasting model has been designed so that it is similar to that of the expected sales demand forecasting model for simplicity and similarity of operation. The model was constructed so that it too would be responsive to changes in demand, but not so much so that it would fluctuate wildly under unusual demands. It is based on forecasting the mean absolute deviation (MAD). The MAD is related to the standard deviation of demand by the following formula [Ref. 10: p.31:]

$$\sigma_{SALES} = 1.25 \times MAD \qquad \text{(eqn 5.9)}$$

Equation 5.10 is for forecasting the MAD.

$$MAD_{(N+1)} = \alpha \left| f_{(N)} - d_{(N)} \right| + (1-\alpha)\, MAD_{(N)} \qquad \text{(eqn 5.10)}$$

where:

MAD(n+1) = the forecasted mean absolute deviation (MAD) for the next quarter.

|f(n) - d(n)| = the absolute value of the current quarter's deviation where f(n) is the demand forecast and d(n) was the actual demand for the past quarter.

MAD(n), is the mean absolute deviation

for this quarter that was forecasted last quarter.

The value of the smoothing constant, alpha, should be selected so as to be reasonably responsive to changes in demand. The value of 0.3 is again suggested for the same reasons as those mentioned for the exponential smoothing model for expected sales discussed in the preceding section.

E. TOTAL DEMAND FORECAST MODEL

The total demand over a quarter is the sum of the demands from recruit inductions and sales. The expected demand from each source can be forecast as discussed above. Similarly, the standard deviations of demand can also be forecast as described above.

The forecast of expected total demand is then the sum of the expected quarterly demand from the recruits and sales; that is,

$$D_{TOTAL} = D_{RECRUITS} + D_{SALES} \qquad \text{(eqn 5.11)}$$

The forecast of the standard deviation of total demand is determined from summing the squared standard deviations of the quarterly recruit and sales demands and taking the square root of the sum. Equation 5.12 illustrates the calculation.

$$\sigma_{TOTAL} = \sqrt{\sigma^2_{RECRUITS} + \sigma^2_{SALES}} \qquad \text{(eqn 5.12)}$$

Insufficient data exists to be able to test hypotheses about the underlying probability distributions associated with quarterly recruit and sales demands for a given size of a given item. However, the assumption of quarterly demand in each case being normally distributed is quite reasonable given the quantities demanded. In fact, the U. S. Navy uses the normal distribution for all items for which the forecasted expected quarterly demand exceeds five units [Ref. 19].

If the normality assumption is made for the recruit and sales demands, from the probability theory [Ref. 12] the total quarterly demand will also be normally distributed with a mean demand of D(total) and a standard deviation of σ(total) . A basic requirement is that the recruit and sales demands are statistically independent (i.e.: no correlation exists in a given quarter). This requirement may not be completely satisfied but the discrepancy is expected to be small since recruits would not be expected to begin affecting sales demand until the quarter following their induction.

F. THE INVENTORY MODEL

As was stated earlier, a periodic review model has been proposed. The time between reviews is to be three months in keeping with the current Coast Guard review interval. The time when the review should be conducted and the amount of each size of item to order remain to be specified.

The time for the review should be a procurement lead time (approximately 20 days) before the start of the quarter. It would be logical therefore to take the physical inventory count just prior to this time. If, on the other hand, the time when the count is taken is fixed as the end of a quarter, then demand forecast should be based on the three months beginning when the order arrives.

A quantity of stock should be ordered so that adequate service is provided to recruits and customers until the next order arrives. The quantity to be ordered will also depend upon the on-hand inventory at the time of placing an order.

The Requisition Objective (RO) for this model should be the sum of the expected demand over the lead time plus one quarter and some safety stock [Ref. 20]. The expected demand over the lead time plus one quarter can be computed as the product of the forecast of total demand for a quarter and the appropriate factor from Table IV; that is, if the lead time is 20 days, then the factor will be 1.18 and the product is,

$$\mu_{TOTAL} \times 1.18 \qquad \text{(eqn 5.13)}$$

The safety level will depend upon the level of service that is desired. As was mentioned earlier, service level is the percentage of demands that are filled from on-hand stock. The formula for computing safety stock is Equation 5.14,

$$\text{SAFETY STOCK} = Z \cdot \sigma_{TOTAL} \qquad \text{(eqn 5.14)}$$

where Z is determined from the normal probability distribution once a service level has been specified. Table VII provides for a set of Z values which should be sufficient for this computation.

TABLE VII

Z Value Table

SERVICE LEVEL	Z VALUE
50%	0.00
80%	0.85
85%	1.04
90%	1.28
95%	1.65
98%	2.05
99%	2.32
99.9%	3.05
99.99%	3.72

In summary then,

$$RO = 1.18\,\mu_{TOTAL} + Z \cdot \sigma_{TOTAL}. \qquad \text{(eqn 5.15)}$$

Once the value of this Requisitioning Objective has been established, the quantity to be ordered will be the difference between the RO and the on-hand quantity obtained from the just completed inventory count.

If the scheduled recruit inductions per quarter fluctuate, the the RO will fluctuate in direct reaction to those fluctuations. On the other hand, the exponential smoothing model for sales will attempt to not be over-reactive to recent random fluctuations.

G. SERVICE LEVELS

In order to clarify and quantify the significance of service levels on safety stock, a sensitivity analysis was conducted using the previous utility shirt data over various service levels from 50% to 99.9%. (Note: you can never achieve 100%, you can only approach it.) The purpose of the sensitivity analysis is to demonstrate the cost sensitivity of carrying inventory as a function of service level. The analysis is contained in Table VIII

TABLE VIII

Incremental Carrying Costs as a Function of Service Level

SERVICE LEVEL	Z VALUE	SIZE XS	SIZE S	SIZE M	SIZE L	SIZE XL	TOTAL
50%	0.00	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
85%	1.04	17	120	180	60	9	386
90%	1.28	146	864	989	436	26	2461
95%	1.64	334	1986	2868	993	60	6241
98%	2.05	548	3253	4708	1635	94	10238
99.9%	3.05	1070	6351	9194	3193	188	19997

It is easy to see that costs increase rapidly as the service level nears 1.0. It is interesting to note that it costs approximately 20% more to provide the additional 5% service level increase from the 85% level to the 90% level. Ideally, the service levels in all of the Coast Guard's clothing facilities should have the depth of safety stock needed to satisfy 99.9% of the demands. However, the carrying costs for providing this high level of service are nearly triple the costs of the current 85% level of service as the data in Table VIII illustrates.

It is important to mention that a one-time investment to establish the sales safety stock is also necessary. Thus, any decision regarding the levels of desired service will have to be carefully tempered with the right blend of cost conscientiousness and customer consideration.

H. SUMMARY

This chapter has presented a model for inventory control of Coast Guard clothing and small stores at the USCG Training Center, Cape May, New Jersey. The model uses an aggregate of separate forecasts for recruit and sales demands. The forecasting models were developed independently because of the differing nature of their data bases. Both the forecast of expected recruit demand and sales demand and the respective standard deviations for the quarterly interval between inventory counts are needed. The standard deviations are used to compute the safety stocks for this model. These stocks can be adjusted to provide any desired level of service. It should be noted, however, that any safety stock decision to provide a higher level of service than is currently provided for sales will necessitate a one-time only purchase of additional stock.

Chapter VI will discuss some of the implementation issues regarding the proposed inventory control model.

VI. CONCLUSIONS AND RECOMMENDATIONS

This thesis has reviewed the inventory control and management procedures of clothing and small stores at the USCG Training Center at Cape May, New Jersey. It was noted that the current system of inventory management is a manually operated HI-LO system that generates orders for items when the inventory drops to a certain pre-established level. The current system is reactionary in nature and as a consequence has been unable to adequately satisfy both the recruit and sales demands. Although the value of the total clothing inventory is large, about $1.8 million, continued stock shortages exist in popular items. A significant amount of the inventory value is tied up in many years' worth of stock of non-moving or extremely slow moving items. It is clear that an inventory of this significance is in need of more management attention than it has received in the past.

A periodic review inventory model is proposed for managing the clothing and small stores system at Cape May. It is believed that the proposed system offers improvements in forecasting the anticipated demand and by utilizing some of the existing system's perceived limitations such as; required quarterly physical inventories, advantageously. The current forecast of the anticipated numbers of recruits to be inducted each month, promulgated by Commandant (G-PMR), is not being utilized to predict recruit uniform demands and it is logical that those schedules should be used. The proposed model therefore includes the recruit forecast as an essential factor.

The proposed model is also an improvement in the safety stock area. The existing method of providing safety stock for protection against unusual demands is to stock an extra months' supply based on the average monthly demands. The proposed model forecasts the quarterly average and standard deviation of demand and uses the latter to determine the needed safety stock.

It was noted that there currently exists a stated service level of 85% for District clothing lockers, but the district clothing lockers only deal with retail sales. It is reccommended that this level of service be reviewed in light of the Commandant's objectives.

Since the Cape May facility deals with recruit demands as well as retail demands out of the same inventory it is not possible to have two service levels such as 98% for recruits and 85% for sales. This is because the lower stated level would inevitably "rob" from the higher level. This could be resolved by having the inventories for each population be physically separate. If this is practical then it is recommended that a high service level such as 95% be stated for the training center facility. It is clear that the recruit population should receive substantially higher service levels. The argument in favor of a combined inventory is that a lower aggregate safety level is required because any low demands by one customer type provides extra stock for the other customer type.

The implementation of the proposed model will not save costs immediately because of the one-time investment ("get well costs") needed to bring the level of sales safety stock up to the point where the desired service level can be provided for the fast moving sizes. The best balance between desired levels of service and inventory carrying costs is difficult to determine. It will indeed need to be resolved at a high management level before this inventory model can be implemented.

In the long run the benefits of better customer service, increased inventory accuracy, and increased service morale will accrue. Additionally, any inventory management system, such as the proposed model, will help slow the current growth in total inventory ceiling value by controlling costs through anticipating demand.

Although the sales demand forecast and requsite safety stock forecast was developed for the Cape May facility, the "sales" portion of the model is implementable at District and Headquarters unit clothing lockers throughout the Coast Guard. Clearly there are advantages to forecasting anticipated demands for these other retail outlets with a better model. It is recommended that the sales portion of this model be considered for implementation at other retail clothing facilities in the Coast Guard.

The proposed system is an important first step in improving the inventory management of clothing within the Coast Guard. It is not offered as a panacea for there will undoubtedly be improvements and refinements that can be made. However, the proposed system is considered to be a step forward in effectively managing the clothing inventory.

APPENDIX A

FIRST AND SECOND ISSUES OF UNIFORMS TO RECRUITS

MALE FIRST ISSUE

QUANTITY	ITEM	COST
1	Seabag	16.76
1	Belt	.76
1	Buckle	.42
1	Cap, Garrison	4.09
1	Cap, Work	2.52
1	Cap, Watch (Seasonal)	2.07
6	Drawers, Cotton	6.24
1	Gloves, Black (Seasonal)	16.19
1	Insignia, Garrison Cap	1.46
1	Utility, Jacket	19.33
2	Workshirts, SS	17.12
1	Shirt, LB SS	5.83
2	Shirts, Work LS	21.36
1	Shoes, Gym	9.30
8	Socks, Black	5.12
4	Towels	8.00
4	Trousers, Undress	55.52
1	Swim Trunks	6.80
6	Undershirts	8.70
2	Nametags	.74
1	Raincoat	37.52
1	Shoes, Safety	21.99
1	Shoes, Dress	18.70

MALE SECOND ISSUE

QUANTITY	ITEM	COST
2	Coat, Dress	119.18
2	Covers, Crown	4.88
1	Frame, Hat	6.13
1	Insignia, Dress	2.07
2	Shields, Gold	4.08
1	Mount, Hat	1.52
1	Necktie	1.94
1	Shirt, White LS	8.36
2	Trouser, Dress	36.08
2	Strip, SA	.96
1	Gloves, White	5.16
3	Shirts, LB LS	24.84
2	Shirts, LB SS	11.66
1	Shoes, Dress	18.70
1	Chinstrap	.28

FEMALE FIRST ISSUE

QUANTITY	ITEM	COST
1	Seabag	16.76
1	Cap, Garrison	8.36
4	Towels	8.00
1	Shoes, Safety	21.99
2	Shirts, Work LS	31.66
1	Cap, Watch	2.07
1	Shoes, Gym	9.30
2	Shirt, Work SS	18.58
1	Shirt, LB SS	6.98
1	Insignia, Garrison	1.46
1	Gloves, Black	2.89
6	Anklets	5.16
1	Raincoat	39.05
4	Slacks, Undress	69.76
1	Shoes, Oxford	16.60
1	Belt	.76
1	Buckle	.42
1	Cap, Work	2.52
1	Jacket, Utility	19.33
2	Nametags	.74

FEMALE SECOND ISSUE

QUANTITY	ITEM	COST
1	Gloves, White	2.89
1	Handbag	11.76
2	Ascots	7.92
1	Necktie, Black	1.77
1	Scarf, White	2.07
1	Raincover	2.34
1	Tanktop	6.67
1	Sweater, LS	7.18
1	Shirt, White	8.66
2	Shirts, LB SS	13.96
1	Cap, Dress	27.22
1	Insignia, Dress	2.07
2	Coats, Trop	65.26
3	Shirts, LB LS	22.47
2	Coats, Dress	78.92
2	Shields, Gold	4.08
1	Skirt, Dress	11.98
2	Slacks, Dress	19.82
2	Stripes, SA	1.10
1	Shoes, Dress	16.75

APPENDIX B

FACTORS FOR MEN'S AND WOMEN'S UNIFORMS

MEN'S

LOW BLACK SHOES

6R	.002
6W	.002
6½R	.002
6½W	.002
7R	.020
7W	.003
7½R	.021
7½W	.010
8R	.061
8W	.020
8½R	.101
8½W	.025
9R	.134
9W	.031
9½R	.128
9½W	.053
10R	.118
10W	.029
10½R	.089
10½W	.025
11R	.048
11W	.016
11½R	.025
11½W	.009
12R	.017
12W	.009

SAFETY SHOES

6R	.003
6½R	.003
7R	.011
7W	.011
7½R	.020
7½W	.008
8R	.082
8W	.013
8½R	.098
8½W	.021
9R	.101
9W	.014
9½R	.150
9½W	.056
10R	.133
10W	.021
10½R	.077
10½W	.025
11R	.054
11W	.018
11½R	.043
11½W	.010
12R	.010
12W	.012
12½R	.006

LONG SLEEVE SHIRT

13½	30	.002
	31	.003
	32	.002
14	29	.001
	30	.007
	31	.018
	32	.011
	33	.021
	34	.011
14½	30	.011
	31	.033
	32	.061
	33	.020
	34	.032
	35	.011
15	30	.003
	31	.029
	32	.087
	33	.039
	34	.048
	35	.018
15½	30	.006
	31	.020
	32	.042
	33	.059
	34	.070
	35	.012
	36	.001
16	31	.011
	32	.021
	33	.041
	34	.027
	35	.025
	36	.024
16½	31	.002
	32	.014
	33	.070
	34	.040
	35	.016
17	33	.008
	34	.008
	35	.009
	36	.001
17½	33	.003
	34	.001
	35	.001

SHORT SLEEVE SHIRT

13	.008
13½	.013
14	.084
14½	.211
15	.222
15½	.255
16	.133
16½	.060
17	.009
17½	.004
18	.001

C.G. WORK SHIRT

XS	.059
S	.295
M	.468
L	.171
XL	.007

MEN'S

DRESS COAT

33S	.004
33R	.004
34S	.009
34R	.015
34L	.004
35S	.010
35R	.041
35L	.010
36S	.018
36R	.043
36L	.033
36XL	.010
37S	.024
37R	.089
37L	.038
37XL	.017
38S	.017
38R	.095
38L	.032
38XL	.014
39S	.008
39R	.078
39L	.035
39XL	.014
40S	.014
40R	.042
40L	.050
40XL	.017
41S	.007
41R	.032
41L	.032
41XL	.013
42S	.003
42R	.027
42L	.031
42XL	.008
43S	.003
43R	.010
43L	.011
43XL	.008
44S	.002
44R	.009
44L	.006
44XL	.004
45R	.001
45L	.001
46S	.001
46R	.001
46L	.001
47R	.001
47L	.001
48R	.001
48L	.001

DRESS TROUSERS

27S	.007
27R	.007
27L	.002
27XL	.001
28S	.013
28R	.014
28L	.004
28XL	.002
29S	.021
29R	.041
29L	.019
29XL	.002
30S	.034
30R	.063
30L	.041
30XL	.010
31S	.027
31R	.074
31L	.045
31XL	.010
32S	.027
32R	.080
32L	.016
32XL	.004
33S	.015
33R	.053
33L	.032
33XL	.011
34S	.011
34R	.055
34L	.038
34XL	.011
35S	.024
35R	.026
35L	.025
35XL	.005
36S	.005
36R	.027
36L	.020
36XL	.005
37S	.001
37R	.009
37L	.010
37XL	.003
38S	.001
38R	.012
38L	.009
38XL	.002
39R	.001
39L	.004
39XL	.002
40S	.002
40R	.003
40L	.003
40XL	.002

DRESS TROUSERS (con't)

41R	.001
41L	.001
42R	.001
42L	.002
42XL	.002
44R	.002

UNDRESS TROUSERS

27S	.004
27R	.010
27L	.003
27XL	.004
28S	.016
28R	.029
28L	.009
28XL	.004
29S	.025
29R	.028
29L	.012
29XL	.007
30S	.032
30R	.100
30L	.028
30XL	.007
31S	.022
31R	.078
31L	.040
31XL	.002
32S	.028
32R	.054
32L	.032
32XL	.004
33S	.019
33R	.054
33L	.033
33XL	.011
34S	.012
34R	.051
34L	.018
34XL	.008
35S	.010
35R	.035
35L	.012
35XL	.009
36S	.007
36R	.038
36L	.021
36XL	.005
37R	.003
37L	.002
37XL	.004
38S	.004
38R	.020
38L	.007
38XL	.005
39S	.001
39R	.003
39L	.001
39XL	.003
40R	.004
40L	.005
40XL	.002
42S	.001

UNDRESS TROUSERS (con't)

42R	.005
42L	.005
44R	.002
44L	.002

MEN'S

HAT FRAMES

6 5/8	.005
6 3/4	.022
6 7/8	.102
7	.274
7 1/8	.236
7 1/4	.221
7 3/8	.033
7 1/2	.091
7 5/8	.012
7 3/4	.004

HAT COVERS

6 1/2	.035
6 5/8	.009
6 3/4	.055
6 7/8	.124
7	.285
7 1/8	.144
7 1/4	.218
7 3/8	.066
7 1/2	.050
7 5/8	.012
7 3/4	.002

GARRISON HAT

6 1/2	.013
6 5/8	.005
6 3/4	.052
6 7/8	.081
7	.189
7 1/8	.233
7 1/4	.247
7 3/8	.077
7 1/2	.077
7 5/8	.013
7 3/4	.013

BALL CAP

6 1/2	.005
6 3/4	.044
7	.372
7 1/4	.405
7 1/2	.164
7 3/4	.050

RAINCOATS

34S	.005
34R	.002
34L	.002
34XL	.005
36S	.033
36R	.061
36L	.005
36XL	.002
38S	.008
38R	.138
38L	.150
38XL	.020
40S	.027
40R	.146
40L	.108
40XL	.018
42S	.014
42R	.065
42L	.075
42XL	.013
44S	.005
44R	.020
44L	.040
44XL	.014
46R	.007
46L	.007
46XL	.003
48R	.003
48XL	.004

WORK JACKETS

32R	.004
34R	.070
36R	.023
38R	.225
40R	.120
42R	.069
44R	.031
46R	.003
48R	.001
34L	.016
36L	.097
38L	.108
40L	.112
42L	.076
44L	.033
46L	.012

WHITE GLOVES

SMALL	.160
MEDIUM	.510
LARGE	.330

BLACK GLOVES

10-L	.060
11-XL	.530
12-XXL	.410

SWIM TRUNKS

SMALL	.280
MEDIUM	.280
LARGE	.440

T-SHIRTS

XS	.024
S	.262
M	.502
L	.150
XL	.062

UNDERWEAR

26	.013
28	.159
30	.274
32	.205
34	.165
36	.075
38	.055
40	.040
42	.014

BLACK SOX

SMALL	.400
MEDIUM	.300
LARGE	.300

GYM SHOES

6	.005
7	.029
8	.125
9	.166
10	.322
11	.228
12	.108
13	.017

WOMEN'S

RAINCOATS

6S	.010
6R	.020
6L	.005
8S	.032
8R	.032
8L	.021
10S	.077
10R	.026
10L	.041
12S	.091
12R	.106
12L	.073
14S	.053
14R	.123
14L	.059
16S	.032
16R	.015
16L	.122
18S	.006
18R	.010
18L	.015
20S	.005
20R	.015
20L	.006
22R	.005

HATS

GARRISON HAT

20½	.008
21	.123
21½	.142
22	.225
22½	.292
23	.097
23½	.085
24	.028

COMBO HAT

20½	.005
21	.025
21½	.107
22	.276
22½	.269
23	.210
23½	.100
24	.008

SWEATERS

S(30-32)	.310
M(34-36)	.570
L(38-40)	.100
XL(42-44)	.020

SHORT SLEEVE BLUE SHIRT

13- 28	.065
13- 30	.023
13½-28	.017
13½-30	.010
13½-32	.072
14- 30	.027
14- 32	.054
14- 34	.193
14½-32	.007
14½-34	.128
14½-36	.173
15- 34	.020
15 -36	.093
15 -38	.026
15½-36	.016
15½-38	.033
15½-40	.005
16 -38	.013
16 -40	.013
16½-40	.007
16½-44	.005

LONG SLEEVE BLUE SHIRT

13 -28-31	.005
13 -30-31	.008
13 -30-33	.011
13½-28-31	.026
13½-32-31	.058
14 -30-31	.008
14 -32-31	.039
14 -32-33	.010
14 -34-31	.212
14 -34-33	.075
14½-32-31	.032
14½-32-33	.034
14½-34-31	.200
14½-34-33	.018
14½-36-31	.059
14½-36-33	.040
15 -34-31	.005
15 -34-33	.007
15 -36-31	.004
15 -36-33	.045
15 -38-31	.021
15 -38-33	.013
15½-36-31	.013
15½-36-33	.016
15½-38-31	.015
15½-38-33	.005
15½-40-31	.005
15½-40-33	.005
16 -42-31	.005
16 -42-33	.005
16½-40-31	.005
16½-42-31	.005

WOMEN'S

DRESS COAT		TROPICAL COAT		DRESS SKIRT		DRESS SLACKS		UNDRESS SLACKS	
6S	.006	6R	.005	6S	.010	7S	.003	6S	.008
6R	.005	7S	.007	6R	.010	7R	.004	6R	.019
7S	.005	7R	.018	6L	.010	7L	.003	6L	.005
7R	.010	8S	.007	7S	.005	8S	.022	8S	.010
8S	.011	8R	.012	7R	.013	8R	.003	8R	.053
9S	.016	8L	.005	7L	.008	8L	.003	8L	.007
9L	.008	9S	.022	8S	.007	9S	.004	10S	.027
10S	.021	9R	.030	8R	.019	9R	.007	10R	.094
10R	.039	9L	.030	8L	.010	9L	.006	10L	.019
10L	.024	10S	.041	9S	.008	10S	.016	10XL	.007
11S	.023	10R	.048	9R	.028	10R	.031	12S	.044
11R	.064	11S	.063	9L	.024	10L	.090	12R	.092
11L	.015	11R	.085	10S	.045	11S	.014	12L	.050
12S	.060	11L	.018	10R	.047	11R	.063	12XL	.014
12R	.080	12R	.158	10L	.011	11L	.038	14S	.031
12L	.016	12L	.031	11S	.040	12S	.003	14R	.060
13S	.026	13S	.005	11R	.041	12R	.157	14L	.101
13R	.081	13R	.053	11L	.035	12L	.051	16S	.023
13L	.011	13L	.020	12S	.005	13S	.012	16R	.071
14S	.029	14R	.089	12R	.088	13R	.063	16L	.156
14R	.100	14L	.081	12L	.016	13L	.030	16XL	.016
14L	.038	15S	.013	13S	.013	14S	.003	18R	.038
15S	.014	15R	.047	13R	.092	14R	.042	18L	.034
15R	.060	15L	.010	13L	.018	14L	.090	20R	.006
15L	.033	16R	.016	14S	.027	15S	.012	20L	.015
16S	.024	16L	.024	14R	.050	15R	.035		
16R	.060	18R	.005	14L	.055	15L	.030		
16L	.008	18L	.036	15S	.010	16S	.008		
18R	.030	20R	.011	15R	.088	16R	.039		
18L	.020	20L	.005	15L	.048	16L	.054		
20R	.003	22L	.005	16S	.010	18S	.009		
20L	.005			16R	.034	18R	.009		
22L	.005			16L	.032	18L	.033		
9R	.024			18S	.008	20S	.003		
				18R	.005	20R	.013		
				18L	.030				

APPENDIX C

MEN'S CLOTHING SIZE PROBABILITY DATA

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Sea Bags		5057	1
Belts		5433	1
Buckles		5829	1
Watchcap		4406	1
Dress Hat Insignia		3276	1
Garrison Hat Insignia		9893	1
Name Tags		11825	1
Neck Tie		7591	1
Gold Shield		7302	1
Towels		20326	1
Ball Cap	6-1/2	3	.0005
	6-3/4	511	10892
	7	2304	.4022
	7-1/4	2092	.3652
	7-1/2	731	.1275
	7-3/4	88	.0154
Short Sleeve Utility Shirt	XS	148	.0112
	X	4390	.3335
	M	5811	.4415
	L	2083	.1582
	XL	731	.0555
Long Sleeve Utility Shirt	S	1882	.2865
	M	3389	.5159
	L	1248	.19
	XL	36	.0055

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Black Gloves	S	300	.0482
	M	224	.036
	L	300	.0482
	XL	3792	.6089
	XXL	1612	.2588
Service Cap Crown	6-1/2	125	.0183
	6-5/8	168	.0245
	6-3/4	356	.0520
	6-7/8	378	.0552
	7	1617	.2362
	7-1/8	1445	.211
	7-1/4	1955	.2855
	7-3/8	413	.0603
	7-1/2	253	.0370
	7-5/8	64	.0093
	7-3/4	39	.0057
	7-7/8	34	.005
Service Hat Frame	6-1/2	3	.0008
	6-5/8	10	.0027
	6-3/4	256	.068
	6-7/8	313	.0831
	7	1012	.2688
	7-1/8	776	.2061
	7-1/4	1041	.2765
	7-3/8	191	.0507
	7-1/2	134	.0356
	7-5/8	16	.0042
	7-3/4	13	.0035
	7-7/8	0	0
White Gloves	S	1090	.2871
	M	1746	.46
	L	960	.2529
Black Socks	M	21813	.573
	L	16236	.427
Swim Trunks	S	1182	.2879
	M	1958	.4769
	L	856	.2085
	XL	110	.0268

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Light Blue Short Sleeve Shirt	13	9	.0007
	13-1/2	28	.0022
	14	1283	.1022
	14-1/2	2034	.162
	15	3545	.2823
	15-1/2	2518	.2005
	16	1717	.1367
	161/2	1004	.08
	17	292	.0233
	17-1/2	97	.0077
	18	29	.0023
Garrison Hat	6-5/8	21	.0051
	6-3/4	378	.0921
	6-7/8	250	.0603
	7	1320	.3185
	7-1/8	415	.1001
	7-1/4	1219	.2942
	7-3/8	150	.0362
	7-1/2	329	.0794
	7-5/8	18	.0043
	7-3/4	44	.0106
Long Sleeve White Shirt	13-29	0	---
	13-30	2	.0007
	13-31	2	.0007
	13-32	1	.0003
	13-33	0	---
	13-34	0	---
	13-1/2-29	0	---
	13-1/2-30	1	.0003
	13-1/2-31	1	.0003
	13-1/2-32	34	.0114
	13-1/2-33	6	.002
	13-1/2-34	0	---
	14-29	5	.0017
	14-30	5	.0017
	14-31	56	.0188
	14-32	49	.0164
	14-33	68	.0228
	14-34	36	.0121
	14-35	0	---
	14-1/2-29	1	.0003
	14-1/2-30	4	.0013
	14-1/2-31	61	.0205
	14-1/2-32	94	.0315

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Long Sleeve White Shirt (continued)	14-1/2-33	98	.0329
	14-1/2-34	103	.0346
	14-1/2-35	40	.0134
	14-1/2-36	0	---
	14-1/2-37	0	---
	15-30	22	.0074
	15-31	66	.0021
	15-32	225	.0755
	15-33	130	.0436
	15-34	155	.0520
	15-35	63	.0211
	15-36	22	.0074
	15-37	0	---
	15-38	0	---
	15-1/2-30	83	.0279
	15-1/2-31	39	.0131
	15-1/2-32	128	.043
	15-1/2-33	149	.05
	15-1/2-34	275	.0923
	15-1/2-35	74	.0248
	15-1/5-36	17	.0057
	16-31	28	.0094
	16-32	81	.0272
	16-33	126	.0423
	16-34	119	.0399
	16-35	73	.0245
	16-36	36	.0121
	16-1/2-32	38	.0128
	16-1/2-33	69	.0232
	16-1/2-34	80	.0268
	16-1/2-35	63	.0211
	16-1/2-36	11	.0037
	16-1/2-37	3	.001
	17-32	9	.003
	17-33	9	.003
	17-34	14	.0047
	17-35	17	.0057
	17-36	22	.0074
	17-37	4	.0013
	17-1/2-33	20	.0067
	17-1/2-34	13	.0044
	17-1/2-35	24	.0081
	17-1/2-36	6	.002

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Drawers (Skivvies)	26	22	.0008
	28	1498	.0579
	30	6020	.2325
	32	6983	.2697
	34	5471	.2113
	36	3747	.1447
	38	1316	.0508
	40	664	.0256
	42	168	.0065
Undershirt	XS	93	.0032
	S	9079	.3140
	M	14193	.4908
	L	5329	.1843
	XL	222	.0077
Utility Jacket	32R	36	.007
	32L	0	---
	34R	255	.0494
	34L	32	.0062
	36R	757	.1466
	36L	196	.038
	38R	849	.1644
	38L	413	.08
	40R	805	.1559
	40L	385	.0746
	42R	423	.0819
	42L	373	.0722
	44R	241	.0467
	44L	210	.0407
	44XL	27	.0052
	46R	57	.0110
	46L	96	.0186
	48R	17	.0033
	48L	21	.0041
All Weather Coat (With Liner)	34S	25	
	34R	32	
	34L	4	
	34XL	9	
	36S	197	
	36R	323	
	36L	180	
	36XL	28	

ITEM	SIZE	1982 QUANTITY	PROBABILITY
All Weather Coat (With Liner) (continued)	38S	237	
	38R	518	
	38L	228	
	38XL	89	
	40S	117	
	40R	637	
	40L	395	
	40XL	58	
	42S	98	
	42R		
	42L	210	
	42XL		
	44S		
	44R	113	
	44L	97	
	44XL	81	
	46S	4	
	46R		
	46L		
	46XL	6	
	48S	0	
	48R	12	
	48L	0	
	48XL	2	
Work Pants	27S	94	.0054
	27R	96	.0056
	27L	67	.0038
	27XL	10	.0006
	28S	124	.0071
	28R	337	.0193
	28L	143	.0082
	28XL	26	.0015
	29S	464	.0266
	29R	626	.0359
	29L	396	.0227
	29XL	62	.0036
	30S	0	---
	30R	1093	.0627
	30L	706	.0405
	30XL	117	.0067
	31S	480	.0275
	31R	1012	.0581
	31L	610	.035
	31XL	229	.0131

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Work Pants (continued)	32S	583	.0334
	32R	1375	.0789
	32L	800	.0459
	32XL	0	---
	33S	0	---
	33R	1072	.0615
	33L	674	.0387
	33XL	464	.0266
	34S	468	.0269
	34R	951	.0546
	34L	200	.0115
	34XL	0	---
	35S	231	.0133
	35R	491	.0282
	35L	413	.0237
	35XL	118	.0068
	36S	209	.012
	36R	801	.046
	36L	397	.0228
	36XL	154	.0088
	37S	66	.0038
	37R	182	.0104
	37L	58	.0033
	37XL	119	.0068
	38S	72	.0041
	38R	193	.0111
	38L	255	.0146
	38XL	53	.003
	39S	15	.0009
	39R	16	.0009
	39L	12	.0007
	39XL	53	.003
	40S	24	.0014
	40R	75	.0043
	40L	44	.0025
	40XL	9	.0005
	42S	15	.0009
	42R	43	.0025
	42L	12	.0007
	42XL	9	.0005
	44S	0	---
	44R	0	---
	44L	7	.0004
	46R	2	.0001
	46L	2	.0001

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Long Sleeve Light Blue Shirt	13-1/2-29	0	---
	13-1/2-30	1	.0001
	13-1/2-31	4	.0003
	13-1/2-32	1	.0001
	13-1/2-33	0	---
	14-29	0	---
	14-30	54	.004
	14-31	217	.018
	14-32	321	.0277
	14-33	312	.0269
	14-34	116	.01
	14-35	38	.0033
	14-1/2-29	0	---
	14-1/2-30	60	.0052
	14-1/2-31	143	.0123
	14-1/2-32	457	.0394
	14-1/2-33	575	.0496
	14-1/2-34	330	.0285
	14-1/2-35	108	.0093
	15-30	45	.0039
	15-31	176	.0152
	15-32	483	.0417
	15-33	675	.0582
	15-34	774	.0668
	15-35	394	.034
	15-36	140	.0121
	15-1/2-30	26	.0022
	15-1/2-31	130	.0112
	15-1/2-32	488	.0421
	15-1/2-33	722	.0623
	15-1/2-34	742	.064
	15-1/2-35	629	.0543
	15-1/2-36	159	.0137
	16-31	97	.0084
	16-32	164	.0141
	16-33	346	.0298
	16-34	517	.0446
	16-35	469	.0405
	16-36	303	.0261
	16-1/2-31	65	.0056
	16-1/2-32	268	.0231
	16-1/2-33	360	.0311
	16-1/2-34	268	.0031
	16-1/2-35	183	.0158
	16-1/2-36	4	.0003
	16-1/2-37	4	.0003

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Long Sleeve Light Blue Shirt (continued)	17-32	19	.0016
	17-33	20	.0017
	17-34	36	.0031
	17-35	103	.0089
	17-36	0	---
	17-1/2-32	3	.0003
	17-1/2-33	12	.001
	17-1/2-34	25	.0022
	17-1/2-35	5	.0004
	17-1/2-36	1	.0001
	18-33	0	---
	18-34	1	.0001
Dress Coat	33 S	6	.0008
	R	28	.0039
	L	3	.0004
	XL	0	---
	34 S	6	.0008
	R	30	.0042
	L	12	.0017
	XL	2	.0003
	35 S	62	.0087
	R	51	.0071
	L	12	.0171
	XL	13	.0172
	36 S	110	.0154
	R	169	.0237
	L	159	.0223
	XL	0	---
	37 S	300	.042
	R	330	.0462
	L	252	.0353
	XL	89	.0125
	38 S	376	.0527
	R	462	.0647
	L	348	.0487
	XL	75	.0105
	39 S	196	.0274
	R	434	.0608
	L	328	.0459
	XL	147	.0206
	40 S	154	.0216
	R	430	.0602
	L	385	.0539
	XL	140	.0196

ITEM	SIZE		1982 QUANTITY	PROBABILITY
Dress Coat (continued)	41	S	76	.0106
		R	272	.0381
		L	295	.0413
		XL	46	.0064
	42	S	258	.0361
		R	313	.0438
		L	184	.0258
		XL	39	.0055
	43	S	26	.0036
		R	74	.0104
		L	63	.0088
		XL	36	.0050
	44	S	28	.0038
		R	87	.0122
		L	92	.0129
		XL	36	.005
	45	S	5	.0007
		R	11	.0015
		L	13	.0018
		XL	12	.0017
	46	S	9	.0013
		R	5	.0007
		L	15	.0021
		XL	6	.0008
	47	S	2	.0003
		R	1	.0001
		L	2	.0003
		XL	3	.0004
	48	S	1	.0001
		R	10	.0014
		L	10	.0014
		XL	2	.0003
Dress Pants	27	XS	0	---
		S	31	.0036
		R	20	.0023
		L	14	.0016
		XL	0	---
	28	XS	0	---
		S	154	.0179
		R	169	.0197
		L	18	.0021
		XL	56	.0065

ITEM	SIZE		1982 QUANTITY	PROBABILITY
Dress Pants (continued)	29	XS	0	---
		S	152	.0177
		R	241	.028
		L	96	.0112
		XL	2	.0002
	30	XS	0	---
		S	146	.017
		R	398	.0463
		L	241	.028
		XL	18	.0021
	31	XS	0	---
		S	276	.0321
		R	390	.0454
		L	303	.0352
		XL	2	.0002
	32	XS	0	---
		S	265	.0308
		R	614	.0714
		L	495	.0576
		XL	200	.0233
	33	XS	0	---
		S	194	.0226
		R	468	.0544
		L	397	.0462
		XL	106	.0123
	34	XS	0	---
		S	147	.0171
		R	450	.0523
		L	335	.0390
		XL	140	.0163
	35	XS	0	---
		S	74	.0086
		R	379	.0441
		L	106	.0123
		XL	63	.0073
	36	XS	0	---
		S	110	.0128
		R	289	.0336
		L	253	.0284
		XL	47	.0055
	37	XS	0	---
		S	3	.0003
		R	252	.0293
		L	75	.0087
		XL	20	.0023

ITEM	SIZE		1982 QUANTITY	PROBABILITY
Dress Pants (continued)	38	XS	0	---
		S	33	.0038
		R	93	.0108
		L	51	.0059
		XL	21	.0024
	39	XS	0	---
		S	7	.0007
		R	47	.0055
		L	23	.0027
		XL	4	.0004
	40	XS	0	---
		S	18	.0021
		R	15	.0017
		L	2	.0002
		XL	21	.0024
	41	XS	0	---
		S	1	.0001
		R	10	.0011
		L	0	---
		XL	2	.0002
	42	XS	0	---
		S	1	.0001
		R	10	.0011
		L	17	.0020
		XL	0	---
	43	XS	0	---
		S	0	---
		R	2	.0002
		L	0	---
		XL	1	.0001
	44	XS	0	---
		S	0	---
		R	3	.0003
		L	2	.0002
		XL	0	---
	45	XS	0	---
		S	0	---
		R	0	---
		L	0	---
		XL	0	---
	46	XS	0	---
		S	0	---
		R	2	.0002
		L	1	.0001
		XL	0	---

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Dress Shoes	4 N	0	---
	4-1/2R	0	---
	4-1/2W	0	---
	5 N	0	---
	5 R	2	.0002
	5 W	4	.0005
	5-1/2N	0	---
	5-1/2R	0	---
	5-1/2W	2	.0002
	6 N	0	---
	6 R	9	.0011
	6 W	6	.0007
	6-1/2N	2	.0002
	6-1/2R	55	.0065
	6-1/2W	67	.0079
	7 N	2	.0002
	7 R	148	.0175
	7 W	31	.0037
	7-1/2N	6	.0007
	7-1/2R	392	.0465
	7-1/2W	30	.0036
	8 N	2	.0002
	8 R	653	.0774
	8 W	192	.0228
	8-1/2N	2	.0002
	8-1/2R	925	.1096
	8-1/2W	86	.0102
	9 N	2	.0002
	9 R	1085	.1286
	9 W	147	.0174
	9-1/2N	2	.0002
	9-1/2R	1312	.1555
	9-1/2W	263	.0312
	10 N	2	.0002
	10 R	836	.0991
	10 W	94	.0112
	10-1/2N	2	.0002
	10-1/2R	634	.0752
	10-1/2W	127	.0151
	11 N	2	.0002
	11 R	458	.0543
	11 W	125	.0148
	11-1/2N	12	.0014
	11-1/2R	229	.0272
	11-1/2W	133	.0158

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Dress Shoes (continued)	12 N	0	---
	12 R	223	.0265
	12 W	56	.0066
	12-1/2N	2	.0002
	12-1/2R	44	.0052
	12-1/2W	14	.0017
	13 N	0	---
	13 R	6	.0007
	13 W	4	.0004
Safety Shoes	4 R	1	.0002
	4 W	5	.0010
	4 XW	6	.0012
	4-1/2R	37	.0074
	4-1/2W	27	.0054
	4-1/2XW	17	.0034
	5 XN	4	.0008
	5 N	10	.0020
	5 R	5	.0010
	5 W	9	.0018
	5-1/2N	9	.0018
	5-1/2R	14	.0028
	5-1/2W	26	.0052
	6 N	17	.0034
	6 R	38	.0076
	6 W	33	.0066
	6-1/2N	7	.0014
	6-1/2R	61	.0123
	6-1/2W	44	.0088
	7 N	12	.0024
	7 R	175	.0352
	7 W	44	.0088
	7-1/2N	12	.0024
	7-1/2R	221	.044
	7-1/2W	36	.0072
	8 N	11	.0022
	8 R	412	.0829
	8 W	19	.0038
	8-1/2N	0	---
	8-1/2R	517	.104
	8-1/2W	37	.0074
	9 N	1	.0002
	9 R	582	.1171
	9 W	77	.0155
	9-1/2N	0	---
	9-1/2R	573	.1153
	9-1/2W	269	.0541

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Safety Shoes (continued)	10 N	0	---
	10 R	552	.1111
	10 W	67	.0135
	10-1/2N	0	---
	10-1/2R	345	.0694
	10-1/2W	11	.0022
	11 N	1	.0002
	11 R	206	.0414
	11 W	52	.0105
	11-1/2N	0	---
	11-1/2R	161	.0324
	11-1/2W	33	.0066
	12 N	0	---
	12 R	85	.0171
	12 W	25	.0050
	12-1/2N	0	---
	12-1/2R	30	.0060
	12-1/2W	30	.0060
	13 N	0	---
	13 R	2	.0004
	13 W	1	.0002
	13-1/2N	0	---
	13-1/2R	1	.0002
Gym Shoes	3	0	---
	3-1/2	0	---
	4	58	.0109
	4-1/2	79	.0149
	5	96	.0181
	5-1/2	57	.0107
	6	117	.022
	6-1/2	118	.022
	7	205	.0386
	7-1/2	231	.0435
	8	414	.0779
	8-1/2	528	.0993
	9	666	.1253
	9-1/2	655	.1232
	10	602	.1132
	10-1/2	510	.0959
	11	555	.1044
	11-1/2	202	.038
	12	126	.0237
	12-1/2	49	.0092
	13	48	.009
	13-1/2	0	---
	14	0	---

APPENDIX D

WOMEN'S CLOTHING SIZE PROBABILITY DATA

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Utility Shirt	XS	132	.1148
	S	600	.5221
	M	337	.2932
	L	80	.0696
Short Sleeve Work Shirt	XS	23	.0485
	S	162	.3417
	M	221	.4662
	L	68	.1434
Short Sleeve White Shirt	8	5	.0595
	10	1	.0119
	12	1	.0119
	14	4	.0476
	16	56	.6666
	18	11	.1309
	20	3	.0357
	22	3	.0357
White Shirt Long Sleeve	6 S	84	.0350
	R	32	.0133
	L	0	---
	8 S	108	.0450
	R	84	.0350
	L	36	.0150
	10 S	60	.0250
	R	408	.1703
	L	204	.0851
	12 S	108	.0451
	R	84	.0351
	L	144	.0601
	14 S	60	.0250
	R	756	.3155
	L	120	.0501
	16 S	0	---
	R	0	---
	L	84	.0350
	18 S	0	---
	R	0	---
	L	24	.0110

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Light Blue Dress Shirt, Long Sleeve (continued)	14-30-31	20	.0100
	-33	20	.0100
	32-31	56	.0281
	-33	88	.0441
	34-31	106	.0531
	-33	79	.0396
	14-1/2-32-31	138	.0692
	-33	20	.0100
	-34-31	265	.1328
	-33	48	.0241
	-36-31	200	.1003
	-33	102	.0511
	15-34-31	53	.0266
	-33	61	.0306
	-36-31	157	.0787
	-33	139	.0697
	-38-31	34	.0170
	-33	15	.0076
	15-1/2-36-31	39	.0195
	-33	61	.0305
	-38-31	53	.0266
	-33	22	.0110
	-40-31	43	.0216
	-33	20	.0100
	16-38-31	9	.0045
	-33	10	.0050
	-40-31	2	.0010
	-33	0	---
	-42-31	4	.0020
	-33	17	.0085
	16-1/2-40-31	0	---
	-33	18	.0090
	-42-31	0	---
	-33	3	.0015
	-44-31	0	---
	-33	7	.0035
Gloves, Black	6	80	.1455
	6-1/2	75	.1364
	7	114	.2073
	7-1/2	76	.1382
	8	85	.1545
	8-1/2	120	.2182

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Light Blue Dress Shirt	13-26	8	.0035
	13-28	92	.0406
	13-30	48	.0212
	13-1/2-28	96	.0423
	13-1/2-30	17	.0075
	13-1/2-32	145	.0640
	14-30	2	.0009
	14-32	102	.0450
	14-34	348	.1535
	14-1/2-32	36	.0159
	14-1/2-34	263	.1160
	14-1/2-36	264	.1165
	15-24	120	.0529
	15-36	299	.1319
	15-38	101	.0446
	15-1/2-36	104	.0459
	15-1/2-38	76	.0335
	15-1/2-40	54	.0238
	16-38	6	.0026
	16-40	24	.0106
	16-42	34	.0150
	16-1/2-40	10	.0044
	16-1/2-42	12	.0053
	16-1/2-44	6	.0026
Anklets	5-8-1/2	396	.8216
	9-11-1/2	86	.1784
Necktie		473	1
Light Blue Dress Shirt, Long Sleeve	13-26-31	2	.0010
	-33	0	---
	-28-31	N/A	---
	-33	N/A	---
	-30-31	N/A	---
	-33	N/A	---
	13-1/2-28-31	N/A	---
	-33	N/A	---
	-30-31	6	.0030
	-33	N/A	---
	-32-31	78	.0391
	-33	0	---

ITEM	SIZE	1982 QUANTITY	PROBABILITY
All Weather Coat	6 S	18	.0271
	R	10	.0151
	L	5	.0075
	8 S	20	.0301
	R	12	.0181
	L	8	.0120
	10 S	51	.0768
	R	27	.0407
	L	3	.0045
	12 S	52	.0783
	R	88	.1325
	L	37	.0557
	14 S	42	.0633
	R	78	.1175
	L	24	.0361
	16 S	39	.0587
	R	46	.0693
	L	36	.0542
	18 S	5	.0075
	R	28	.0422
	L	18	.0271
	20 S	0	---
	R	3	.0045
	L	7	.0105
	22 S	2	.0030
	R	2	.0030
	L	3	.0045
Slacks, Work	6 S	62	.0234
	R	17	.0064
	L	16	.0060
	XL	0	---
	8 S	51	.0192
	R	127	.0479
	L	8	.0030
	XL	21	.0079
	10 S	113	.0426
	R	172	.0648
	L	138	.0520
	XL	13	.0049
	12 S	50	.0188
	R	238	.0897
	L	144	.0543
	XL	57	.0215

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Slacks, Work (continued)	14 S	73	.0275
	R	181	.0682
	L	251	.0946
	XL	41	.0154
	16 S	57	.0215
	R	228	.0859
	L	256	.0965
	XL	49	.0185
	18 S	12	.0045
	R	100	.0327
	L	48	.0181
	XL	32	.0121
	20 S	1	.0004
	R	19	.0072
	L	37	.0139
	XL	40	.0151
	22 S	0	---
	R	0	---
	L	0	---
	XL	2	.0008
Garrison Hat	20	0	---
	20-1/2	N/A	---
	21	76	.1277
	21-1/2	152	.2555
	22	164	.2756
	22-1/2	138	.2319
	23	31	.0521
	23-1/2	21	.0353
	24	13	.0218
Service Hat Crown	20	4	.0051
	20-1/2	24	.0304
	21	78	.0989
	21-1/2	163	.2066
	22	179	.2269
	22-1/2	54	.0684
	23	107	.1356
	23-1/2	97	.1229
	24	83	.1052
	24-1/2	0	---

ITEM	SIZE		1982 QUANTITY	PROBABILITY
Dress Coat	6	S	16	.0151
		R	103	.0974
		L	N/A	---
	7	S	N/A	---
		R	21	.0198
		L	0	---
	8	S	12	.0113
		R	36	.0340
		L	30	.0284
	9	S	18	.0170
		R	15	.0142
		L	13	.0123
	10	S	16	.0151
		R	N/A	---
		L	19	.0180
	11	S	1	.0009
		R	76	.0718
		L	35	.0331
	12	S	33	.0312
		R	115	.1087
		L	38	.0359
	13	S	62	.0586
		R	N/A	---
		L	32	.0302
	14	S	7	.0066
		R	79	.0747
		L	37	.0350
	15	S	6	.0057
		R	41	.0388
		L	45	.0425
	16	S	15	.0142
		R	56	.0529
		L	15	.0142
	18	S	16	.0151
		R	12	.0113
		L	17	.0161
	20	S	N/A	---
		R	9	.0085
		L	12	.0113
	22	S	N/A	---
		R	0	---
		L	0	---

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Work Shoes	4A	1	.0013
	4B	4	.0053
	4C	0	---
	4D	0	---
	4E	0	---
	4-1/2A	1	.0013
	4-1/2B	2	.0026
	4-1/2C	3	.0040
	4-1/2D	3	.0040
	4-1/2E	4	.0053
	5AA	0	---
	5A	2	.0026
	5B	8	.0106
	5C	7	.0093
	5D	2	.0026
	5E	3	.0040
	5-1/2AA	0	---
	5-1/2A	0	---
	5-1/2B	3	.0040
	5-1/2C	13	.0172
	5-1/2D	1	.0013
	5-1/2E	5	.0066
	6AAAA	0	---
	6AAA	0	---
	6AA	5	.0066
	6A	3	.0040
	6B	2	.0026
	6C	24	.0317
	6D	15	.0198
	6E	20	.0265
	6-1/2AAAA	0	---
	6-1/2AAA	0	---
	6-1/2AA	0	---
	6-1/2A	5	.0066
	6-1/2B	36	.0476
	6-1/2C	42	.0556
	6-1/2D	12	.0159
	6-1/2E	6	.0079
	7AAAA	0	---
	7AAA	0	---
	7AA	2	.0026
	7A	10	.0132
	7B	15	.0198
	7C	30	.0397
	7D	23	.0304
	7E	20	.0265

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Work Shoes (continued)	7-1/2AAAA	0	---
	7-1/2AAA	0	---
	7-1/2AA	0	---
	7-1/2A	9	.0119
	7-1/2B	34	.0450
	7-1/2C	25	.0331
	7-1/2D	28	.0370
	7-1/2E	16	.0212
	8AAAA	0	---
	8AAA	0	---
	8AA	1	.0013
	8A	5	.0066
	8B	37	.0489
	8C	35	.0463
	8D	21	.0278
	8E	13	.0172
	8-1/2AAAA	0	---
	8-1/2AAA	0	---
	8-1/2AA	0	---
	8-1/2A	3	.0040
	8-1/2B	37	.0489
	8-1/2C	29	.0384
	8-1/2D	7	.0093
	8-1/2E	15	.0198
	9AAAA	0	---
	9AAA	0	---
	9AA	0	---
	9A	5	.0066
	9B	21	.0278
	9C	24	.0317
	9D	10	.0132
	9E	7	.0093
	9-1/2AAAA	0	---
	9-1/2AAA	0	---
	9-1/2AA	0	---
	9-1/2A	1	.0013
	9-1/2B	1	.0013
	9-1/1C	15	.0198
	9-1/2D	1	.0013
	9-1/2E	3	.0040
	10AAAA	N/A	---
	10AAA	N/A	---
	10AA	0	---
	10A	1	.0013
	10B	6	.0079
	10C	1	.0013
	10D	2	.0026
	10E	0	---

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Work Shoes (continued)	10-1/2AAAA	0	---
	10-1/2AA	0	---
	10-1/2B	5	.0066
	10-1/2D	5	.0066
	11AAAA	0	---
	11AA	0	---
	11B	0	---
	11D	0	---
	11-1/2AA	0	---
	11-1/2B	1	.0013
Slacks	6 S	27	.0164
	R	32	.0194
	L	40	.0243
	7 S	14	.0085
	R	60	.0364
	L	32	.0194
	8 S	2	.0012
	R	80	.0486
	L	64	.0389
	9 S	39	.0237
	R	45	.0273
	L	19	.0115
	10 S	28	.0170
	R	58	.0352
	L	54	.0328
	11 S	75	.0456
	R	22	.0133
	L	86	.0522
	12 S	38	.0230
	R	79	.0480
	L	82	.0498
	13 S	17	.0103
	R	56	.0340
	L	36	.0218
	14 S	35	.0212
	R	76	.0462
	L	86	.0522
	15 S	39	.0237
	R	36	.0218
	L	40	.0243
	16 S	12	.0073
	R	55	.0334
	L	69	.0419

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Slacks (continued)	18 S	34	.0206
	R	25	.0152
	L	41	.0249
	20 S	N/A	N/A
	R	9	.0054
	L	3	.0018
	22 S	0	---
	R	0	---
	L	0	---
Handbags		562	1.0
Ascots		998	1.0
Sweater	30	8	.0198
	32	64	.1588
	34	N/A	N/A
	35	180	.4466
	38	69	.1712
	40	82	.2034
Skirt	6 S	5	.0071
	R	22	.0316
	L	11	.0158
	7 S	5	.0071
	R	7	.0100
	L	2	.0028
	8 S	11	.0158
	R	25	.0359
	L	12	.0172
	9 S	3	.0043
	R	14	.0201
	L	23	.0330
	10 S	21	.0302
	R	19	.0273
	L	18	.0259
	11 S	1	.0014
	L	32	.0460
	12 S	11	.0158
	R	42	.0604
	L	35	.0503
	13 S	5	.0071
	R	31	.0446
	L	84	.1208
	14 S	9	.0129
	R	12	.0172
	L	47	.0676

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Skirt (continued)	15 S	N/A	---
	R	83	.1194
	L	7	.0100
	16 S	2	.0028
	R	24	.0345
	L	25	.0359
	18 S	1	.0014
	R	24	.0345
	L	10	.0143
	20 S	N/A	---
	R	3	.0043
	L	8	.0115
	22 S	1	.0014
	R	0	---
	L	0	---
Sweater	Smll (30-32)	135	.1722
	Med (34-36)	389	.4961
	Lg (38-40)	136	.1734
	XLg (42-44)	124	.1581
Scarf		614	1.0
Gloves, White	6	99	.1843
	6-1/2	66	.1229
	7	101	.1880
	7-1/2	110	.2048
	8	100	.1862
	8-1/2	61	.1136
Coat, Light Blue	6 S	N/A	---
	R	12	.0107
	L	0	---
	7 S	31	.0276
	R	21	.0187
	L	N/A	---
	8 S	23	.0205
	R	44	.0392
	L	9	.0080
	9 S	29	.0258
	R	31	.0276
	L	33	.0294

ITEM	SIZE	1982 QUANTITY	PROBABILITY
Coat, Light Blue (continued)	10 S	40	.0356
	R	98	.0874
	L	N/A	---
	11 S	44	.0392
	R	57	.0508
	L	47	.0419
	12 S	41	.0365
	R	47	.0419
	L	41	.0365
	13 S	43	.0383
	R	43	.0383
	L	45	.0401
	14 S	12	.0107
	R	45	.0401
	L	54	.0481
	15 S	N/A	---
	R	82	.0731
	L	27	.0240
	16 S	N/A	---
	R	18	.0160
	L	35	.0312
	18 S	10	.0089
	R	7	.0062
	L	19	.0169
	20 S	0	---
	R	15	.0133
	L	N/A	---
	22 S	3	.0026
	R	6	.0053
	L	9	.0080
Hat, Combo Service	20-1/2	31	.0440
	20	1	.0014
	21-1/2	76	.1081
	21	44	.0625
	22-1/2	138	.1963
	22	156	.2219
	23	110	.1564
	23-1/2	105	.1493
	24	42	.0597

APPENDIX E

REGULAR ENLISTMENTS - FY 81

MONTH	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
QUOTA	600	550	131	750	650	425	375	375	250	253	267	450	5076
CUM	600	1350	1481	2031	2681	3106	3481	3856	4106	4359	4626	5076	5076
ENLISTED	602	552	179	750	650	427	374	374	252	253	268	450	5131
CUM	602	1154	1333	2083	2733	3160	3534	3908	4160	4413	4681	5131	5131

WOMEN

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
ENLISTED	37	34	4	58	48	36	27	29	23	18	21	46	381
CUM	37	71	75	133	181	217	244	273	296	314	335	381	381

MINORITY

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
GOAL	108	99	32	135	117	77	68	68	45	45	48	81	923
CUM	108	207	239	374	491	568	636	704	749	794	842	923	923
ENLISTED	110	100	28	153	133	81	83	84	49	48	53	91	1013
%	18.3	18.1	15.6	20.4	20.5	19.0	22.2	22.2	19.6	18.9	20	20.2	19.7
CUM	110	210	238	391	524	605	688	772	821	869	922	1013	1013
CUM %	18.2	18.2	17.9	18.8	19.2	19.2	19.5	19.7	19.7	19.7	20	19.7	19.7
BLACK	71	62	13	113	92	44	51	55	38	32	34	61	666
CUM	71	133	146	259	351	395	446	501	539	571	605	666	666
ORI	8	6	2	9	2	7	8	5		2	4	6	59
CUM	8	14	16	25	27	34	42	47	47	49	53	59	59
AM IND	4	7	1	5	5	5	6	4	2	4	4	6	53
CUM	4	11	12	17	22	27	33	37	39	43	47	53	53
SP AM	27	25	12	26	34	25	18	20	9	10	11	18	235
CUM	27	52	64	90	124	149	167	187	196	206	217	235	235
REC ONBD	267	277	266	260	262	263	262	255	261	253	256	261	
MIN REC	56	55	54	54	53	53	52	52	54	54	56	58	

ENLISTMENTS BY CATEGORY

RECRUITS

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
CAPE MAY	299	297	1	390	336	232	184	190	129	120	155	246	2579
ALAMEDA	243	204	96	288	238	149	133	124	98	105	82	145	1905
TOTAL	542	501	97	678	574	381	317	314	227	225	237	391	4484

PRIOR SERVICE NON-RATED

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
EX-CG	2	3	3	0	2	1	1	4	1	2		3	22
EX-CGR	5	1	14	1	5	3	2	4	3	5	1	5	49
OTHER	16	18	3	29	24	18	18	22	7	10	5	15	185
TOTAL	21	22	20	30	31	22	21	30	11	17	6	23	256

PRIOR SERVICE RATED

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
EX-CG	31	12	32	17	28	16	18	22	9	9	13	19	226
EX-CGR	4	10	14	11	5	3	5	2			2	1	57
OTHER	2	7	16	14	12	5	13	6	5	2	10	16	108
TOTAL	37	29	62	42	45	24	36	30	14	11	25	36	390

APPENDIX F

REGULAR ENLISTMENTS - FY 82

MONTH	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
QUOTA	450	450	150	450	450	450	420	360	220	356	356	354	4466
CUM	450	900	1050	1500	1950	2400	2820	3180	3400	3756	4112	4466	4466
ENLISTED	450	452	150	450	450	452	419	361	220	366	365	362	4497
CUM	450	902	1052	1502	1952	2404	2823	3184	3404	377	4135	4497	4497
WOMEN													
ENLISTED	30	40	1	53	51	49	56	49	26	54	37	40	486
CUM	30	70	71	124	175	224	280	329	355	409	446	486	486
MINORITY													
GOAL	81	81	28	81	81	81	76	65	40	64	64	64	806
CUM	81	162	190	271	352	433	509	574	614	678	742	806	806
ENLISTED	103	98	29	95	77	87	94	89	59	101	92	91	1015
%	23	21.7	19.3	21.1	17.1	19.3	22.4	24.7	26.8	27.6	25	25	22.6
CUM	103	201	230	325	402	489	583	672	731	832	924	1015	1015
CUM %	23	22.3	21.9	21.6	20.6	20.3	20.7	21.1	21.5	22.1	22.4	22.6	22.6
BLACK	65	61	17	61	47	57	64	53	33	67	51	52	628
CUM	65	126	143	204	251	308	372	425	458	525	576	628	628
ORI	6	2	2	4	1	2	4	2	0	2	6	5	36
CUM	6	8	10	14	15	17	21	23	23	25	31	36	36
AM IND	9	10	2	8	7	10	8	11	12	10	10	11	108
CUM	9	19	21	29	36	46	54	65	77	87	97	108	108
SP AM	23	25	8	22	22	18	18	23	14	22	25	23	243
CUM	23	48	56	78	100	118	136	159	173	195	220	243	243
REC ONBD	261	263	264	269	268	260	233	226	224	213	216	215	
MIN REC	58	59	60	60	61	58	58	59	55	54	55	56	
ENLISTMENTS BY CATEGORY													
RECRUITS													
CAPE MAY	231	244	2	260	276	450	419	361	220	350	345	332	3490
ALAMEDA	157	132	98	164	165	0	0	0	0	0	0	0	716
TOTAL	388	376	100	424	441	450	419	361	220	350	345	332	4206
PRIOR SERVICE NON-RATED													
EX-CG	2	1	5	6	1					2	3	5	25
EX-CGR	4	2	3	2						2	4	7	24
OTHER	18	19	4	5	5	1					5	10	69
TOTAL	24	22	12	13	6	1				4	12	22	118
PRIOR SERVICE RATED													
EX-CG	24	30	12	11	1	1				6	4	6	95
EX-CGR	0	8	13	0	1					4	4	0	30
OTHER	14	16	13	2	1					0	0	2	48
TOTAL	38	54	38	13	3	1				10	8	8	173

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